The Krauss Collection of Australian Fruit Flies (Tephritidae–Diptera)[1]

D. Elmo Hardy[2]

The following report deals with the fruit flies collected in Australia by N. L. H. Krauss of the Territorial Board of Agriculture and Forestry, Honolulu, T. H. This collection was made in conjunction with the studies which Mr. Krauss carried on in Australia concerning the biological control of fruit flies. It apparently represents the most comprehensive survey of the Australian fruit fly fauna which has been made (or at least reported in the literature). The collection contained approximately 60,000 specimens, and, although the studies were conducted largely in Queensland, it included almost all of the known Australian Dacini as well as a good representation of the other fruit flies. The collection, which contained 32 species and 3 varieties, includes all of the Australian Dacinae known to the writer except *Dacus* (*Strumeta*) *bancrofti* (Tryon), *D.* (*Strumeta*) *strigatus* (Perkins), *D.* (*Neodacus*) *newmani* (Perkins), *D.* (*Zeugodacus*) *atrisetosus* (Perkins), *D.* (*Zeugodacus*) *caudatus* Fabricius (?), and *Callantra aequalis* (Coquillett).

The basing of genera upon single chaetotaxic characters and upon secondary sexual characters does not appear to be a sound practice. Unless supported by other characters of generic value, these complexes should probably be considered as subgenera. I am preparing a reclassification of the Dacini of the world based upon a comparative study of many thousands of specimens, including genotypic specimens of nearly all of the "genera," and I am convinced that the classification could be placed on a more sound basis by treating most of these groups as subgenera of *Dacus* sens. lat. When large series of specimens are studied, intergrades between the various so-called "genera" are so often encountered that they completely break down the classification schemes of some of the contemporary and earlier workers. A detailed discussion of the value of these characters will be given in the reclassification study now being prepared. The subgeneric characters are discussed in their proper sequence in the text, but these characters are not repeated in the specific descriptions.

In the descriptions the length of the front is measured from the top of the ocellar triangle to the antennae, and the width is measured at its widest point. Evidently some other authors have measured the length as from the lower ocellus to the top of the lunule. It is probable that a more accurate comparison of the breadth of the front could be made by comparing it with the eye width or possibly with the width of the ocellar triangle. In some species the broadening of the front is accompanied by a lengthening so that a comparison of the width and the length is of little value. The first antennal segment is measured as seen in dorsal view from base to apex. The second segment is measured on the lower margin as seen in direct lateral view. The third segment is measured on the ventral margin as seen in direct side view. The facial spots, or markings, are of value in the classification of these flies, but considerable variation does occur and supporting characters must be relied upon. The markings and coloration of the thorax and abdomen are fairly constant for

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specimens of the same age (before killing). Much variation in coloration does occur, but it appears to be very closely associated with the tenerality of the specimen.

The nomenclature used for the wing venation is that of Comstock-Needham (Comstock, 1918) as emended by Tillyard (1919) and Alexander (1927; 1929). I have used this terminology in other papers on the Tephritidae and various other families of Diptera. Following this system, vein R_2 is considered as being fused with R_1; vein R_3 is considered a simple vein; R_4 and R_5 are fused; M_1 and M_2 are fused as are M_3 and M_4; the large crossvein is the m; the portion which was formerly called the base of Cu_1 is now considered to be the m–cu crossvein; the anal cell of other writers is considered to be the cubital cell, and the vein extending from the apex of this cell is Cu_1+1st A, not Cu_2+2d A. In the descriptions the length of the narrowed portion of the cubital cell is compared to the length of the free portion of Cu_1+1st A. This refers to that portion of the wing from the apex of cell Cu to the margin. Often the vein itself will evanesce or become very faint and in some species may not reach the wing margin.

The female ovipositors have been found to be of great taxonomic importance. By comparing the size, shape, and structural details, the distinguishing of species is greatly facilitated. To study these structures it is necessary that they be mounted on microscope slides and examined at magnifications of 150 times or more. The basal segment of the ovipositor (the oviscape of Munro, 1947) is usually the most conspicuous portion of the ovipositor in unmounted specimens. It is the seventh abdominal segment and bears a pair of spiracles. The position of these spiracles appears to be of taxonomic importance in some species. The distance of the spiracles from the base of the segment is measured to the posterior lateral margins, not to the base of the convex margin of the venter. The inversion membrane is the membranous middle segment of the ovipositor which bears the rasper. This is considered to be the modified eighth abdominal segment. The arrangement of the scales or stout setae on this segment is of taxonomic importance, especially the comparative approximation of the scales of the rasper to the base of the segment. The piercer is the apical segment of the ovipositor and is called the aculeus by some writers. It is distinctive in shape and is most useful in distinguishing species. The breadth of the segments which make up the ovipositor is measured at the widest points. The measurements of the bodies given in the descriptions do not include the ovipositor or the antennae.

All of the rearings are from the fruits of the various indicated hosts. The wording "ex such and such host" should be interpreted to mean the fruit of that host. Except for a few specimens which Mr. Krauss obtained from C. P. Hely, all the material covered in this report was collected by N. L. H. Krauss.

Acknowledgments: I am greatly indebted to Mr. Krauss for his wholehearted interest and cooperation in making such a thorough survey of the Australian Dacini. He is a most capable and energetic collector, and his efforts have given us a wealth of valuable information on the Australian fruit flies. I am also grateful to Mr. Alan May, Department of Agriculture and Stock, Toowoomba, Queensland, for supplying information on, and representatives of, the Queensland species described by Perkins and May, and to Mr. Jos. E. Collin, Newmarket, England, for providing information on Macquart's type of *Urophora bicolor*. The drawings have been prepared by Miss Marian Adachi, University of Hawaii, and the preparatory work on this collection and a large share of the bibliographical details of this study were very efficiently handled by Betty Lou Defibaugh, United States Department of Agriculture, Bureau of Entomology and Plant Quarantine, Honolulu. Their able assistance is much appreciated, for their efforts have added greatly to the completeness of this paper.

DACUS Fabricius sens. lat.

Dacus Fabricius 1805. Syst. Antl. p. 272.
Tridacus Bezzi 1915. Bul. Ent. Res. 6: 88.

In a broad sense the genus *Dacus* includes those Dacini which possess the following combination of characters: no complete suture across the mesonotum; no strong spines on the front femora; the second portion of vein M_{1+2} not bent downward; cell 1st M_2 not strongly narrowed behind the r–m crossvein; the abdomen not petiolated and the antennae not greatly elongated; the third segment not much longer than the face, and the antennae not two or more times longer than the face. All of the Australian Dacini, with the possible exception of *Callantra aequalis* (Coquillett), are treated as *Dacus* sens. lat. by this writer.

GENOTYPE: *Dacus armatus* Fabricius.

KEY TO THE SUBGENERA OF *Dacus* (SENS. LAT.) KNOWN TO OCCUR IN AUSTRALIA[3]

1. Scutellum with four strong bristles.. 8
   Scutellum with two bristles..... 2
2. Prescutellar bristles absent..... 3
   Prescutellars present..... 5
3. Anterior supra-alar bristles absent... 4
   One pair of anterior supra-alars present.....*Neodacus* Perkins
4. Crossvein r–m situated below the middle of cell 1st M_2 (discal cell) and distinctly before the apex of vein R_{1+2}; three to four pairs of inferior fronto-orbital bristles present.....
   .....*Heterodaculus* n. subgen.
   Crossvein r–m beyond the middle of 1st M_2 and about opposite the end of vein R_{1+2}; two pairs of inferior fronto-orbitals present.*Daculus* Speiser
5. Anterior supra-alar bristles present... 6
   Anterior supra-alar bristles absent...
   .....*Afrodacus* Bezzi
6. Third tergum of male with a row of cilia on each side...*Strumeta* Walker
   Third tergum of male not ciliated... 7
7. Male wing with a well-developed supernumerary lobe (at apex of vein Cu_1+1stA)....*Asiadacus* Perkins[4]
   No distinct supernumerary lobe in male wing.....*Gymnodacus* Munro
8. Prescutellar bristles present..... 9
   No prescutellar bristles.....
   .....*Austrodacus* Perkins
9. Third tergum of male ciliated..... 10
   No cilia on sides of third tergum of male..... 11
10. No anterior supra-alar bristles present; supernumerary lobe not developed in male wing. *Hemizeugodacus* n. subgen.
    Anterior supra-alar bristles present; supernumerary lobe well developed in male wing.....*Zeugodacus* Hendel
11. Supernumerary lobe present in male wing.....*Melanodacus* Perkins
    No supernumerary lobe in male wing
    .....*Paratridacus* Shiraki

[3]*Callantra* Walker has not been treated here since it was not represented in the Krauss collection. Its exact position is not clearly understood at the present time. The typical species of *Callantra* are very characteristic and certainly appear to be generically distinct from *Dacus*. There are, however, borderline species which may link these two groups very closely.

DACUS (AFRODACUS) Bezzi

Afrodacus Bezzi 1924. Ann. S. Afr. Mus. 19: 452.

This subgenus is characterized by the absence of the anterior supra-alar bristles. In other respects it is like the subgenus *Strumeta*. The group occupies a borderline position between *Strumeta* and *Daculus*. Specimens of *D.* (*Afrodacus*) *jarvisi* (Tryon) have been studied which have a well-developed anterior supra-alar bristle on one side of the mesonotum. These would occupy a position halfway between *Afrodacus* and *Strumeta*. Some aberrant specimens of *D.* (*Daculus*) *murrayi*

[4]Not known to occur in Australia. It is included here because of a difference of interpretation of writers. Perkins and May (1949) recently described *Asiadacus calophylli*. I have treated this in the subgenus *Gymnodacus*.

(Perkins) have definite prescutellar bristles in varying stages of development. Many specimens of this species which have the characters of *Afrodacus* have been studied. The typical forms fall into *Daculus*.

GENOTYPE: *Afrodacus biguttulus* (Bezzi)

KEY TO KNOWN SPECIES OF *Dacus* (*Afrodacus*) OF THE PACIFIC REGION

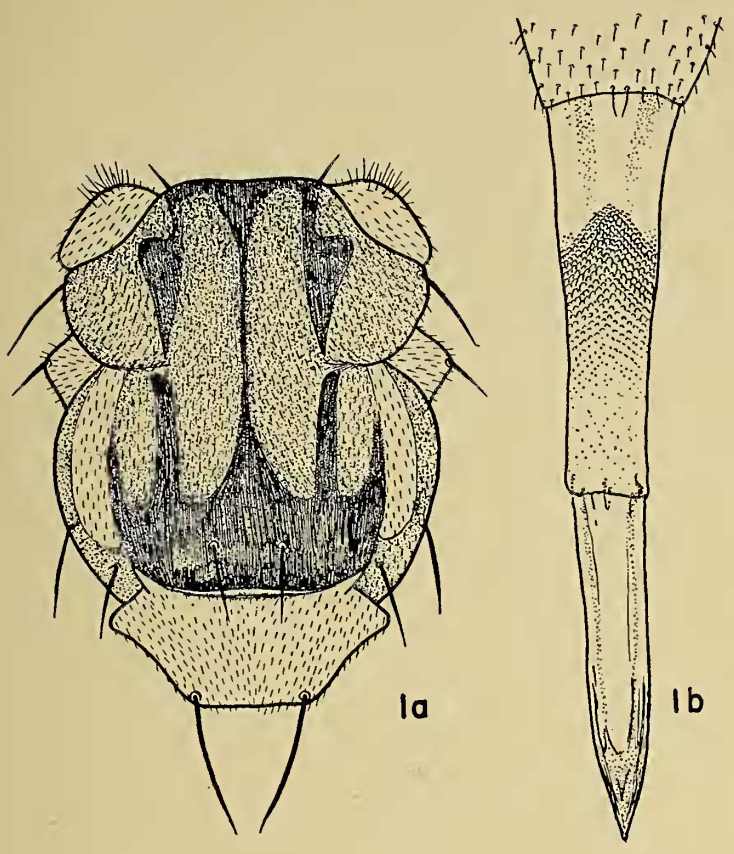
1. Wings with infuscations along either the r–m or the m crossveins 2
   Wings without infuscations on the crossveins 3
2. Posterior two-thirds of the scutellum brown; r–m crossvein infuscated; indistinct facial spots present (Australia) . . . . *brunneus* (Perkins and May)
   Scutellum yellow, except for a narrow basal band of black; m crossvein infuscated, r–m hyaline; face with a transverse black band (Java) . . . . . *javanensis* (Perkins)
3. Humeri and notopleural calli not joined by a yellow band 4
   Humeri and notopleural calli joined by a broad yellow band; scutellum yellow, distinctly paler than the mesonotum . . . . . *jarvisi* (Tryon) 3a
   3a. Halteres yellow; squamae and fringes white; the anterior notopleural bristles are located within the confines of the yellow band connecting the humeri and notopleural calli . . . . . *jarvisi jarvisi* (Tryon)
   Halteres reddish-brown; squamae and fringes yellow; anterior notopleural bristles on a reddish-brown ground color . . . . . *jarvisi* var. *halteratus* (Hendel)
4. Mesonotum chiefly brownish-yellow, without black markings; scutellum brownish-yellow, darker on the sides; cubital streak narrow and faint; in the female, vein Cu_1+1st A from the apex of the cubital cell to the wing margin is about one and one-half times longer than the narrowed portion of the cubital cell (Samoa) . . . . . *aenigmaticus* Malloch
   Mesonotum conspicuously marked with black (Fig. 1*a*); scutellum yellow; cubital streak broad and distinct; in the female, the section beyond the apex of the cubital cell is shorter than the narrowed portion of the cell . . . . . *aberrans* n. sp.

Dacus (Afrodacus) aberrans n. sp.

Fig. 1*a–c*

This species appears to be more closely related to *D. aenigmaticus* Malloch than to any other known species. It is differentiated by the largely black mesonotum, by the more elongate cubital cell in the wing, by the abdomen lacking black markings on the sides of segments 3 to 5, and by the scutellum being yellow, much paler in color than the mesonotum.

MALE. A moderately small species predominantly reddish in color except for the black median portion of the mesonotum. *Head:* Rufous except for the facial spots and the ocellar triangle. The head bristles are all black. There are two pairs of inferior frontoorbitals. The front is nearly parallel sided, and it is one and one-half times longer than wide. There are no dark spots at the bases of the bristles and the tumescence is dark reddish, faintly discolored with a brownish hue. The facial spots are oval and are spaced about three-fourths of their length from the oral margin; the spots are about one-fourth as long as the face. The third antennal segment is slightly brownish, is three times longer than wide, and is just slightly longer than the face. *Thorax:* The hind portion of the mesonotum is extensively black. This black area extends laterally almost to the inner supra-alar bristles and anteriorly to a point opposite the position occupied in other subgenera by the anterior supra-alar bristles (Fig. 1*a*). Beyond this point the black pattern breaks down into three vittae—one median and two sublateral—which extend to the front margin of the mesonotum. The sublateral black vittae are inter-



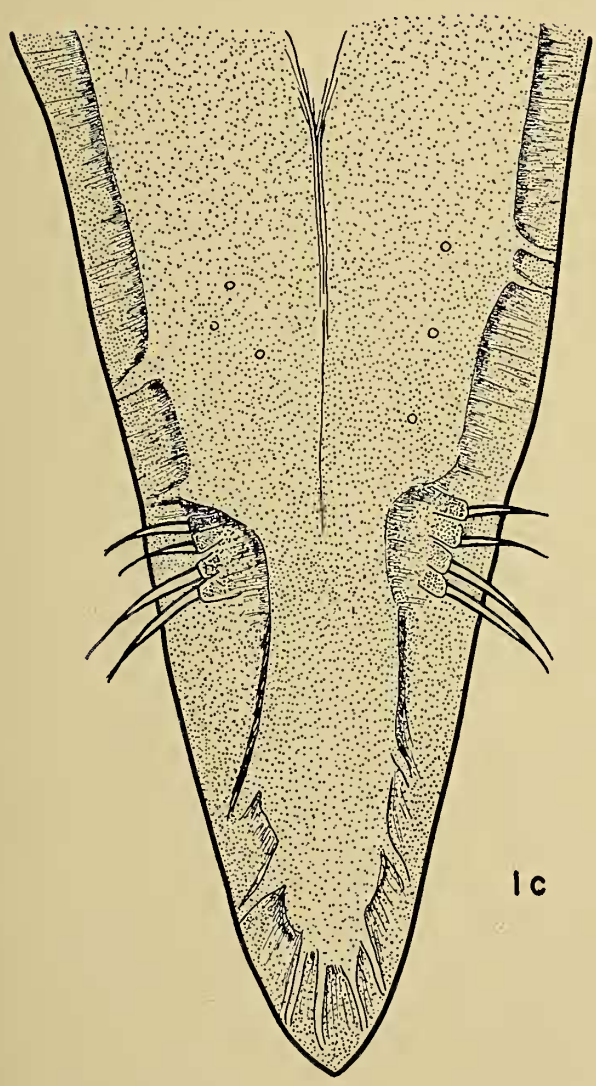


FIG. 1. *Dacus* (*Afrodacus*) *aberrans* n. sp.: a, thorax, dorsal view; b, female ovipositor, full length; c, ovipositor, apex.

rupted slightly at the suture. The median vitta is expanded on the anterior part of the mesonotum. In some specimens the black coloring broadly covers the front portion of the dorsum, occupying much of the medial part beyond the suture. In others it forms just a T-shaped pattern behind the bases of the scapular bristles. The area of the mesonotum between and outside the black markings, excepting the lateral yellow stripes, is reddish in color and densely gray pollinose. The yellow stripes are very short; they do not extend to the inner supra-alar bristles. The scutellum is all yellow except for a very narrow black band across its base. The pleura are yellow to rufous, except for the predominantly black sternopleura and for a black spot on the front of the mesopleura and sternopleura, a spot on the hypopleura, and one on the lower margin of the metapleura. The metanotum is black except for a red spot in the central portion. The vertical yellow stripe on the mesopleura is expanded on the dorsal portion and extends anteriorly to a point opposite the anterior notopleural bristles. *Legs:* Yellow, except for the brownish hind tibiae. *Wings:* First two costal cells hyaline, devoid of microtrichia except in the apex of the second cell. Costal band distinct, brownish, not extending noticeably below vein R_3 except along the wing margin. The band is not expanded in the apex and extends halfway through cell R_5. The r–m crossvein is straight and nearly vertical in position. It is situated distinctly beyond the middle of cell 1st M_2. The cubital streak is broad, filling all of the basal portion of cell M_4 and extending nearly to the top margin of the m–cu crossvein. The narrowed portion of the cubital cell is two and one-half times longer than the portion from the apex of the cell to the wing margin. *Abdomen:* Nearly all reddish except for a black vitta extending down the middle of terga 3 to 5. The base of the third tergum possesses a narrow black crossband in some specimens but is brownish in others. The first tergum is brownish on the basal portion and yellow-red

apically. The second tergum has a subbasal brown to slightly blackish crossband and a yellow-white apex. In some specimens the median black vitta is indistinct on terga 3 and 4.

Length: Body, 5.5–5.8 mm.; wings, 4.8–5.0 mm.

FEMALE. The hind tibiae often have a blackish tinge on their apical halves. The narrowed portion of the discal cell is one and one-fifth times longer than the portion beyond the apex of the cell. *Ovipositor:* Short and inconspicuous; the exposed portion is not as long as the fifth abdominal segment. The extended ovipositor is very short and comparatively broad (Fig. 1*b*), the over-all length is about 3.3 mm. The piercer measures approximately 1.08 mm. by 0.24 mm. The oviduct extends to within 0.19 mm. of the apex of the piercer and the setae are about 0.06 mm. from the apex. The setae and the plate bearing them are rather short, the length of the plate, or the length of the longest setae, being equal to about one-fourth the distance from the bases of the distal pair of setae to the apex of the piercer (Fig. 1*c*). The inversion membrane is about 1.2 mm. long by 0.3 mm. wide. The scales of the rasper are broad and blunt and extend to within 0.3 mm. of the base of the eighth segment. The basal segment of the ovipositor is about 1.0 mm. long by 1.0 mm. wide, the spiracles are situated approximately 0.22 mm. from the posterior lateral margins of the segment.

Holotype male, allotype female, and eight paratypes (three males and five females): Lake Barrine, Queensland, ex *Litsea* (?), Nov., 1949.

Type and allotype deposited in the United States National Museum. Two paratypes in the Bishop Museum; two in the Territorial Board of Agriculture and Forestry collection; two in the Hawaiian Sugar Planters' Association collection; and two at the University of Hawaii.

Dacus (Afrodacus) jarvisi (Tryon)

Fig. 2*a*, *b*

Chaetodacus jarvisi Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 201–203.

Dacus (*Chaetodacus*) *australis* Hendel 1928. Ent. Mitteil. 17(5): 341–342. New synonymy based upon a careful comparison with the original description and confirmed by Dr. M. Hering, who compared specimens of *jarvisi* with paratypes of *australis*.

This species is readily distinguished from all known members of this subgenus by the continuous yellow markings connecting the humeral and notopleural calli. Only the more important characteristics are given in the following description.

MALE. Front very slightly expanded on the lower half, nearly two times longer than wide. The vertical bristles are brownish-yellow to yellow, the frontals are brown to black. Two pairs of inferior fronto-orbital bristles are present. The facial spots are nearly circular and their height is equal to about one-fourth the length of the face. The third antennal segment is just slightly longer than the face and is appoximately three times longer than wide. *Thorax:* Chiefly reddish, mesonotum largely gray pollinose. The gray pollen is dissected by one median and two sublateral shining lines extending the full length of the dorsum. *Wings:* First two costal cells hyaline with no microtrichia except in the apex of the second cell. The costal band is rather narrow and does not extend below vein R_3 except at its base and extreme apex. The band expands slightly in the wing apex and extends nearly halfway between the ends of vein R_{4+5} and M_{1+2}. The cubital streak is broad, filling all of the base of cell M_4 and extending nearly to the top margin of the r–m crossvein. The narrowed portion of the cubital cell is about three times longer than the distance from the apex of the cell to the wing margin. *Abdomen:* Chiefly yellow to rufous. First tergum all yellowish, sometimes faintly brownish tinged. Second tergum with a subbasal brown to

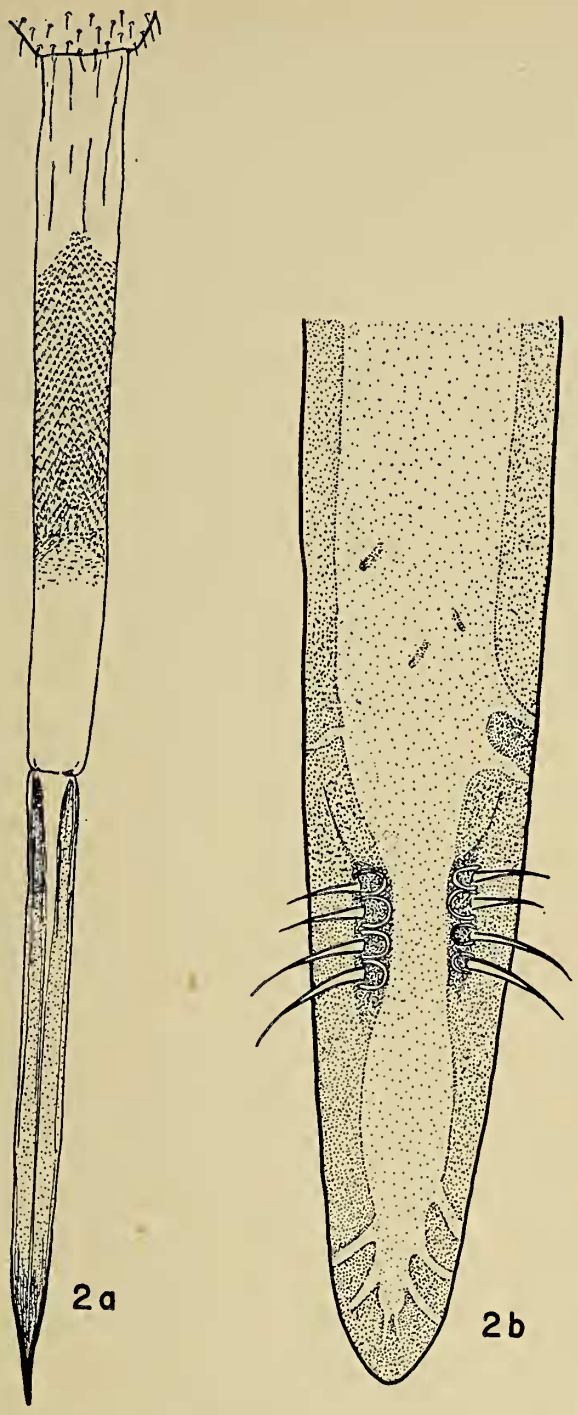


FIG. 2. *Dacus* (*Afrodacus*) *jarvisi* (Tryon): a, female ovipositor, full length; b, ovipositor, apex.

black band; the apical half is whitish-yellow. The third tergum has a narrow black band across its base and a narrow black line running longitudinally down the middle. The black median vitta continues on over terga 4 and 5.

Length: Body, 6.5–7.0 mm.; wings, 6.0–6.5 mm.

FEMALE. The narrowed portion of cell Cu is slightly more than one and one-half times longer than the distance from its apex to the wing margin. *Ovipositor:* The exposed portion is about equal in length to the combined lengths of segments 4 and 5. The extended ovipositor (Fig. 2*a*) measures about 5.0 mm. in length. The piercer (Fig. 2*b*) is approximately 1.7 mm. long by 0.22 mm. wide. The oviduct extends to within 0.23 mm. of the apex of the piercer. The setae are about 0.05 mm. from the apex, this distance being equal to about two times the length of the plate bearing the setae or to two times the lengths of the longest setae. The inversion membrane is about 2.0 mm. in length by 0.3 mm. in width. The scales of the rasper extend to within 0.6 mm. of the base of segment 8. The basal segment of the ovipositor is about 1.4 mm. long by 1.2 mm. wide. The spiracles are located 0.28 mm. from the posterior-lateral margins of the segment.

TYPE LOCALITY: Stanthorpe, South Queensland; reared from pear and quince.

Type in Queensland Museum.

Large numbers of specimens were in the Krauss collection from the following: Cairns, Queensland, ex papaya, *Eugenia cormiflora*, *Semecarpus australiensis*, guava, *Careya australis*, and *Terminalis catappa*, Dec., 1949, to Apr., 1950.

Dacus (Afrodacus) jarvisi var. halteratus Hendel

Dacus (*Chaetodacus*) *australis* var. *halterata* Hendel 1928. Ent. Mitteil., 17(5): 342-343.

This variety was not present in the Krauss collection but because so much material has been studied from the Cairns area its status should be discussed here. The variety *halteratus* was described from a single female specimen taken at Cairns. Dr. Hering (in correspondence) said that he had studied the type of "*halterata*" years ago and that it "is only an individual form" of *jarvisi*. It is probable that this should not be considered a variety but should be treated as a synonym. Of the large number of specimens of *jarvisi* which have been studied from the Cairns area none has been seen which fits the description of *halteratus*. Hendel's specimen was probably discolored. According to the original description and Dr. Hering, the variety differs

from the typical form by having the halteres reddish-brown with brown knobs, the squamae and their fringe yellow, and the anterior notopleural bristles situated on a reddish-brown ground color. The anterior notopleural bristles in typical *jarvisi* are located near the outer edge of the yellow band. There is obviously some variation in this character, and in many specimens the bristle will be placed just outside the confines of the yellow coloring.

TYPE LOCALITY: Cairns, Queensland.

Type in the Deutsches Entomologisches Institut, Berlin.

DACUS (ASIADACUS) Perkins

Asiadacus Perkins 1937. Roy. Soc. Queensland, Proc. 48(9): 57.

This subgenus was not represented in the Krauss collection from Australia but because one of the species, *Dacus* (*Gymnodacus*) *calophylli* (Perkins and May), was recently described as an *Asiadacus*, a discussion of this group is pertinent to this paper.

The group differs from *Dacus* (*Strumeta*) in lacking the cilia on the third tergum of the male. It is very close to *Gymnodacus* (see discussion under *Gymnodacus*) and is separated only by the presence of a supernumerary lobe in the wings of the males. The subgenus is poorly defined, and it is questionable whether or not the presence or absence (or degree of development) of the supernumerary lobe has even subgeneric importance in this case.

GENOTYPE: *Chaetodacus bakeri* Bezzi.

KEY TO KNOWN SPECIES OF *Asiadacus*

1. Wings with a very large apical spot which fills all of the apex and extends to vein M_{1+2}; no median yellow stripe on the mesonotum (Philippine Islands) ..... *bakeri* (Bezzi)
   Wings with no well-developed apical spot; mesonotum with a median yellow stripe (Ceylon, India) ..... *diversus* (Coquillett)

DACUS (AUSTRODACUS) Perkins

Austrodacus Perkins 1937. Roy. Soc. Queensland, Proc. 48: 56.

The members of this subgenus are characterized by having four scutellar bristles and no prescutellar and anterior supra-alar bristles. The males have no cilia on the third abdominal tergum and no well-developed supernumerary lobe in the wings. The group is more distinctively set off than are most of the subgenera of *Dacus*, but there are some borderline characteristics present. In some specimens the mesonotal hairs, in the position where prescutellar bristles normally arise, are more strongly developed than the surrounding setae; they are erect, two to three times longer than the other setae, and they have the appearance of being rudimentary prescutellar bristles. The secondary pair of scutellar bristles is sometimes comparatively weak and shows definite intergrading in size. The supernumerary lobe is partially developed in the male wing, occupying an intermediate position between those groups which have a well-developed lobe and those which have none.

GENOTYPE: *Dacus cucumis* French.

D. cucumis is the only known species in this subgenus.

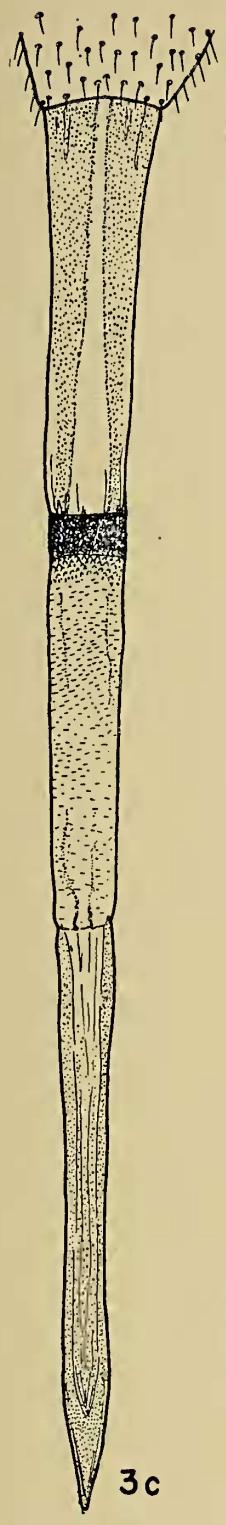
Dacus (Austrodacus) cucumis French

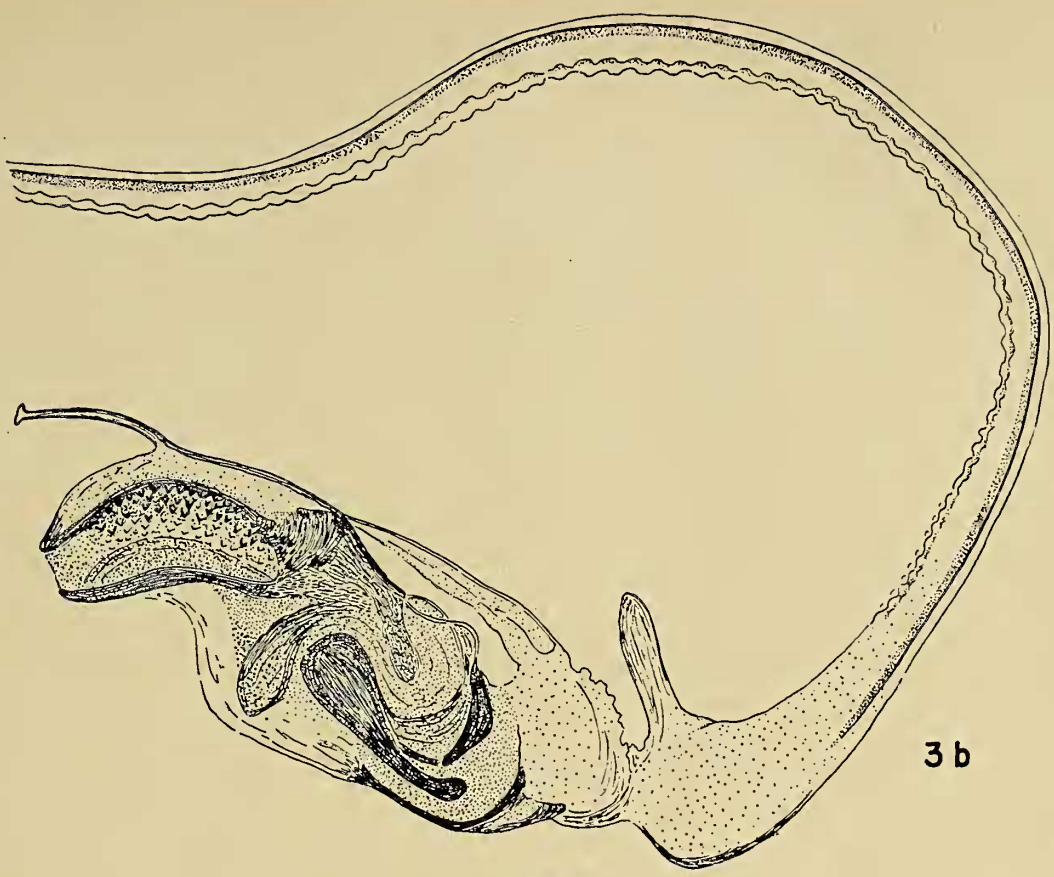
Fig. 3*a–d*

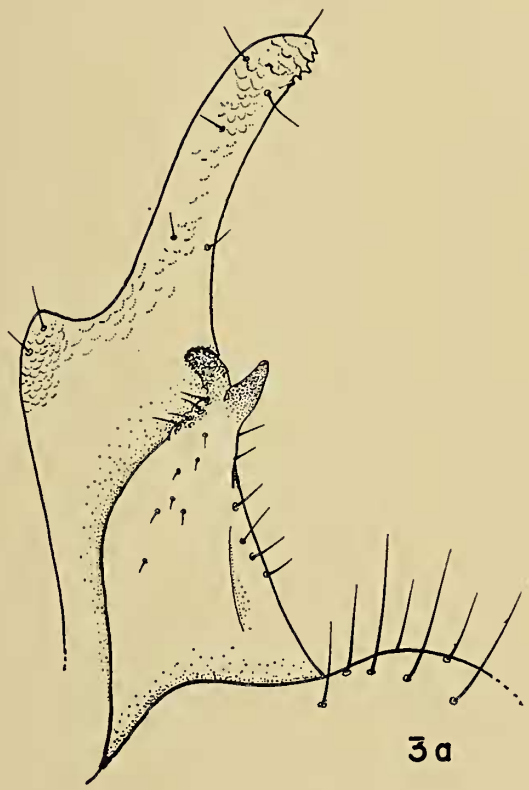
Dacus tryoni var. *cucumis* French 1907. Dept. Agr. Victoria, Jour. 5: 307.

This species is easily recognized by the subgeneric characters listed above. It superficially resembles *Dacus* (*Hemizeugodacus*) *algaiae* n. sp. and *Dacus* (*Daculus*) *signatifer* Tryon. This resemblance is discussed under the description of the above-mentioned species.

MALE. Entirely yellow to rufous except for the black facial spots and some dark markings on the abdomen. *Head:* Front nearly two times longer than wide and clear reddish-







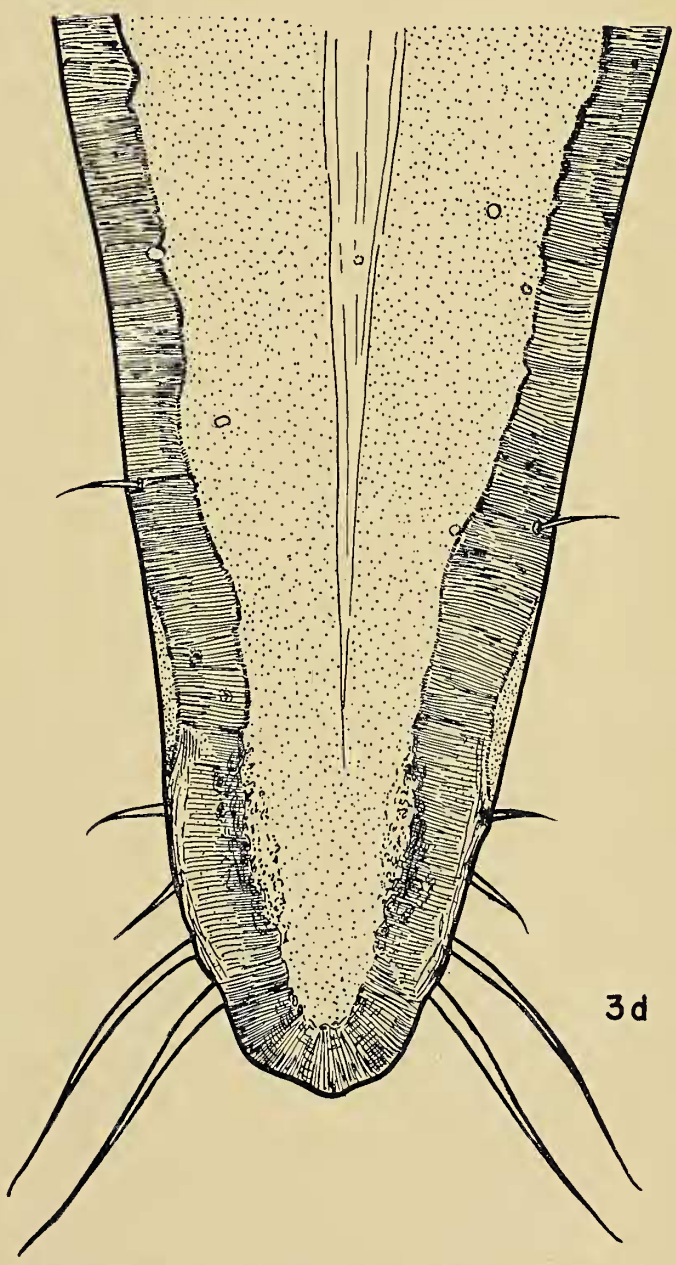


FIG. 3. *Dacus* (*Austrodacus*) *cucumis* French: a, apical lobes of ninth segment of male genitalia; b, apex of male aedeagus; c, female ovipositor, full length; d, apex of ovipositor.

yellow with no discolorations or spots except for a slight brownish marking which sometimes occurs in the central part. The vertical and frontal bristles are dark brown to black, the other head bristles and hairs are yellow. The third antennal segment is comparatively short and broad. It is approximately equal in length to the face and is slightly less than three times longer than wide. The facial spots are oval and their length is equal to about one-third the length of the face. *Thorax:* With three broad, yellow postsutural stripes. The yellow area on each mesopleuron broadens in the dorsal portion and covers almost all of the dorsal margin of that sclerite; the yellow markings of the mesopleura are separated from the humeri by a short space where the integument is rufous. *Legs:* Entirely pale colored, the femora whitish on their basal three-fourths and yellow at their apices. *Wings:* First two costal cells hyaline and devoid of microtrichia except in the apex of the second section. The costal band is very narrow and does not extend below vein R_3 except at its apex. The band extends around the wing margin beyond the apex of vein R_{4+5}. The cubital streak is pale yellow and is broad at its base but fades out just beyond the apex of the cubital cell. The streak occupies all of the basal part of cell M_4 and extends about half way along the m–cu crossvein. There is a distinct indication of a supernumerary lobe at the apex of vein Cu_1+1st A but no well-developed lobe. The narrowed portion of the cubital cell is approximately equal to that section from the apex of the cell to the wing margin. *Abdomen:* First tergum brownish on the sides on basal half, second tergum with a brown subbasal band and a whitish apical band; abdomen otherwise rufous except for an elongate brown spot, or vitta, down the middle of the fifth tergum. *Genitalia:* The tenth segment is well developed and conspicuous. It is hollowed out, spoon-shaped in end view and convex below, and has strong yellow hairs on the venter and around the margins. The apical lobes of the ninth segment are long and slender and have five to six small teeth on the underside of the apex (Fig. 3*a*). A slight ridge or line extends across the apex from each of the teeth. A small secondary lobe is developed at the basal part of each of the long finger-like lobes; the integument of this lobe is microscopically reticulated. The inner basal lobes of the ninth segment have a pair of black, blunt processes at their apices. The aedeagus is distinctive. The apical sac-like portion has the inner walls covered with very stout spine-like processes (Fig. 3*b*). Those spines in the outer portion of the sac have serrated edges. The genital pore is dorsal and extends beyond the remainder of the aedeagus.

Length: Body, 6.0 mm.; wings, 5.6 mm.

FEMALE. The distance from the apex of the cubital cell to the wing margin is one and one-third times greater than the length of the narrowed portion of the cubital cell. *Ovipositor:* In *in situ* mounts the exposed ovipositor is almost as long as terga 4 and 5 combined. When extended the ovipositor is long and slender; when viewed under high power it is very characteristic in development. The over-all length (Fig. 3*c*) is about 6.4 mm. The piercer is approximately 1.7 mm. long by 0.2 mm. wide at its broadest point. The setae are strong and conspicuous and are situated almost at the apex of the piercer; the closest pair is about 0.02 mm. from the apex. The setae which are most distally placed extend well beyond the apex of the piercer. The apex of the piercer is blunt, undulated, and indistinctly trilobed (Fig. 3*d*). The apex of the oviduct is about 0.17 mm. from the tip of the piercer. The inversion membrane is approximately 2.2–2.4 mm. long by 0.3 mm. at its widest point. The scales of the rasper end about 1.1 mm. from the base of the eighth segment. The basal segment of the ovipositor is about 1.5 mm. long by 1.3 mm. at its widest point. The spiracles are situated about 0.17 mm. from the base of the segment measured on the lateral margins.

Length: Body, 6.0–7.0 mm.; wings, 5.5–6.2 mm.

TYPE LOCALITY: Bowen, Queensland.

Type in the Queensland Museum.

About two dozen specimens are in the Krauss collection from: Smithfield, near Cairns, Queensland, ex cucumber, June, 1949; and Ellis Beach, near Cairns, ex *Glochidion harveyanum*, Feb., 1950.

DACUS (DACULUS) Speiser

Daculus Speiser 1924. Beitr. Tierk. Konigsberg 140.

The subgenus *Daculus* is characterized by the absence of prescutellar and anterior supra-alar bristles. It is similar in most respects to *Dacus* (*Strumeta*). This group definitely occupies a borderline position and intergrades into related subgenera. Many specimens of *D. murrayi* which have distinct prescutellar bristles have been examined. Some of the abnormal individuals would have to be classified as *Afrodacus*. Other specimens possess just a single prescutellar bristle or rudiments of one or more of the bristles. Specimens of *D. signatifer* Tryon show definite intergrading toward *Austrodacus* because of the presence of rudimentary secondary scutellar bristles.

Two species of *Dacus* (*Daculus*) are now known from Australia. Both of these have been taken in the vicinity of Cairns, Queensland. There are no other known Australian records for this group.

GENOTYPE: *Dacus oleae* (Gmelin).

KEY TO AUSTRALIAN SPECIES OF *Dacus* (*Daculus*)

Mesonotum with three yellow vittae; abdomen without definite black bands or a black median vitta; costal band narrow, not extending beneath vein R_3 except at apex. . . . *signatifer* Tryon

Mesonotum with just two yellow vittae; abdomen with a black basal band on segment 3 and a black median vitta down terga 3 to 5; costal band extending below vein R_3. . . . . *murrayi* (Perkins)

Dacus (Daculus) murrayi (Perkins)

Fig. 4*a–c*

Daculus murrayi Perkins 1939. Univ. of Queensland, Dept. Biol. 1 (10): 25–26.

This species is readily recognized from the other members of the subgenus by the absence of a median yellow vitta on the mesonotum, by the presence of a black median vitta on abdominal segments 3 to 5 as well as by the differences in wing coloration, the female ovipositor, the shape of the facial spots, and the general body coloring.

The species has been adequately described by Perkins (1939) and figured by Perkins and May (1949). Only the diagnostic characters, with the addition of wing characteristics and a description of the female ovipositor, are presented here.

MALE and FEMALE. A comparatively pale species, without dark markings except for the facial spots, the black marks on the abdomen, and the darkened tibiae of the hind legs. *Head*: The front is about two times longer than wide. The facial spots vary somewhat in size and shape, they are subcircular, and extend nearly to the oral margin. The front has two pairs of inferior fronto-orbital bristles. *Thorax*: Mesonotum chiefly reddish with a light tinge of brown in ground color. This is covered with grayish pruinosity except for the lateral yellow vittae and for three subshining lines extending the entire length of the dorsum. One of these lines is median in position, and the other two lie just inside the lateral yellow vittae. The original description states that "the median line and a line on the outer border of the hoary bands are dark brown." The series of specimens from Queensland show variation from distinctly brownish tinged to entirely rufous. *Legs*: Yellowish, the hind tibiae and the apical subsegments of the tarsi discolored with brown to black. *Wings*: First two sections of costa distinctly yellow-fumose but devoid of microtrichia except for the apical part of the second section and for a line of hairs along

the extreme lower margin of these cells. The costal band is brown and extends just a short distance below vein R_3, terminating almost half way between the apex of vein R_{4+5} and the tip of M_{1+2}. The section of cell R just above cell M is yellow-fumose and densely covered with microtrichia; the section directly above the base of vein M_{3+4} is bright yellow. The cubital streak is yellow-brown and is moderately broad. It fills all of the basal portion of cell M_4, extending to the top margin of the m–cu crossvein. The yellowish coloration extends to about the apex of the cubital cell in the male and half the distance from the apex of the cubital cell to the wing margin in the female. Just above vein Cu_1+1st A is a dense clump of long dark gray to blackish hairs. Below this vein, filling the apical part of the 1st anal cell, is a dark gray to blackish spot produced by a great abundance of closely placed microtrichia in that portion of the wing. Vein Cu_1+1st A is over two times longer than the narrowed portion of the cubital cell in the female. It is just slightly longer than the r–m crossvein. In the male, vein Cu_1+1st A is distinctly less than half the length of the narrowed portion of cell Cu and is three-fourths as long as the r–m crossvein. The supernumerary lobe is distinct in the male. *Abdomen*: Chiefly rufous, with a black, longitudinal vitta down the middle of terga 3 to 5, a transverse band of black across the base of the third tergum and discolorations of brownish to black on the sides of terga 3 to 5. The second tergum also has a narrow brown to blackish basal band in some of the specimens. The males have a row of long black hairs on each side of the third tergum. *Ovipositor*: Comparatively long and conspicuous. In the average specimens the exposed portion of the ovipositor is equal in length to the last three abdominal segments. The basal segment of the ovipositor (segment 7), as seen from above, is one-third longer than the fifth tergum. When fully extended (Fig. 4*a*) the ovipositor, including

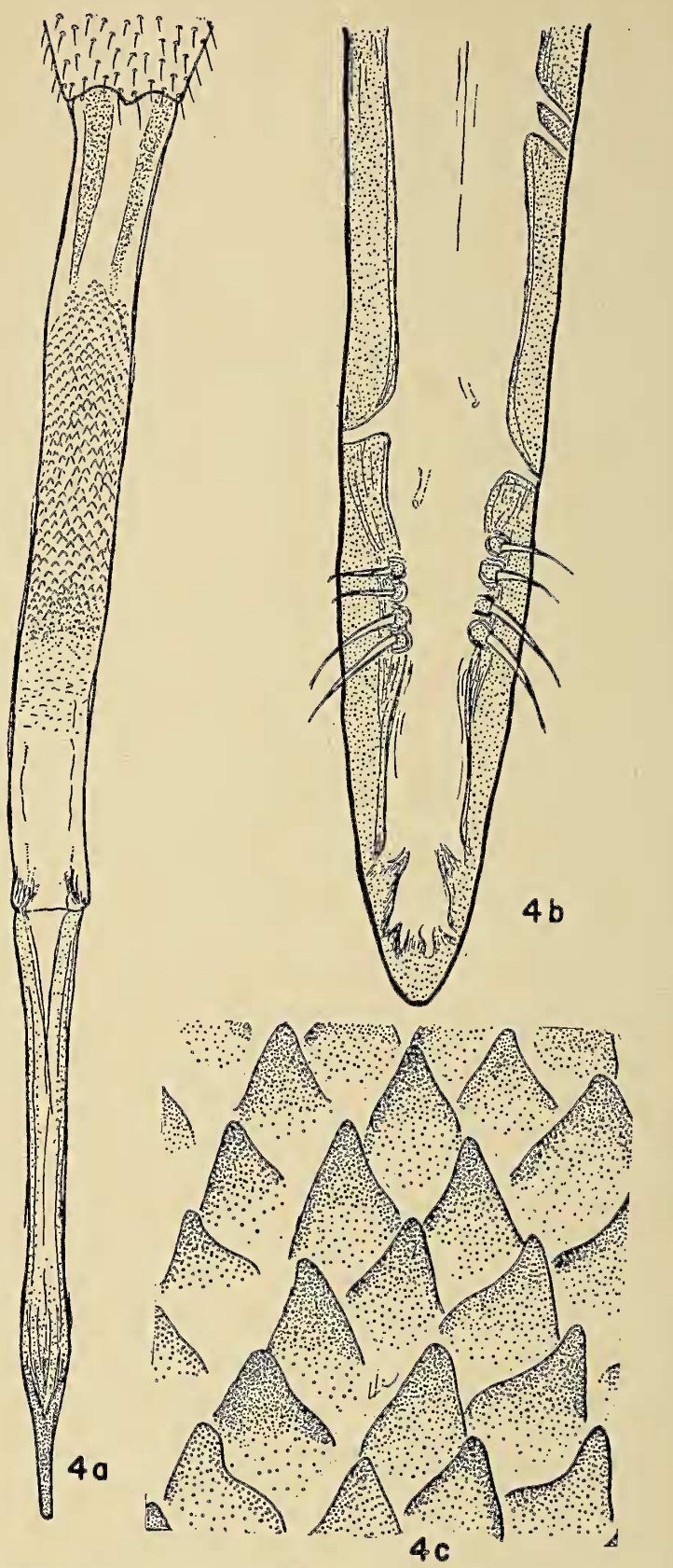


FIG. 4. *Dacus* (*Daculus*) *murrayi* (Perkins): a, female ovipositor, full length; b, apex of ovipositor; c, scales of the rasper.

the basal segment, measures approximately 6.8 mm. in length. The piercer (aculeus) is 2.1 mm. long by 0.14 mm. wide at its widest point. The piercer is gradually tapered beyond the apex of the oviduct into a slender point and possesses four pairs of subapical setae. The two pairs nearest the apex are two times longer than the more basally situated

pairs. The distance between the tip of the ovipositor and the first pair of setae is four times greater than the length of these setae. The apex of the oviduct is about 0.38 mm. from the tip of the piercer (Fig. 4*b*). The inversion membrane (segment 8) is 2.8 mm. long by 0.28 mm. wide at its broadest point. The rasper extends to about 0.61 mm. from the base of the segment. The hook-like processes of the rasper are rather long-pointed (Fig. 4*c*). The basal segment of the ovipositor (oviscape or segment 7) is 1.9 mm. long by 1.22 mm. wide measured at its base. The spiracles are situated about 0.38 mm. from the base of the seventh segment, measured on the lateral margins.

Length: Body, 6.8 mm. (excluding antennae and ovipositor); wings, 6.0 mm. Perkins (1939) gave the measurements as body, 8 mm.; wings, 7 mm.

TYPE LOCALITY: "Murray Island" (Baraku Island, New Georgia group).

Type in the South Australian Museum.

Perkins and May (1949) first recorded this species from Australia, bred from fruits of *Semecarpus australiensis* Engl. A large series is in the Krauss collection, bred from the same host at Cairns, Queensland, in December, 1949.

Dacus (Daculus) signatifer Tryon

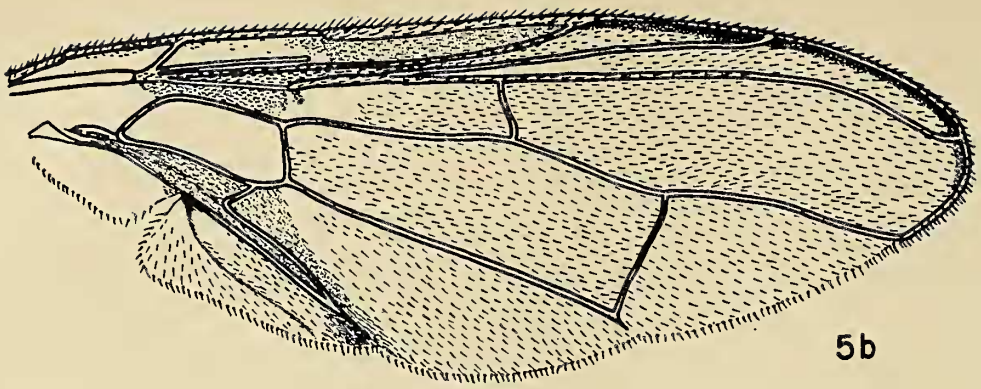
Fig. 5*a–d*

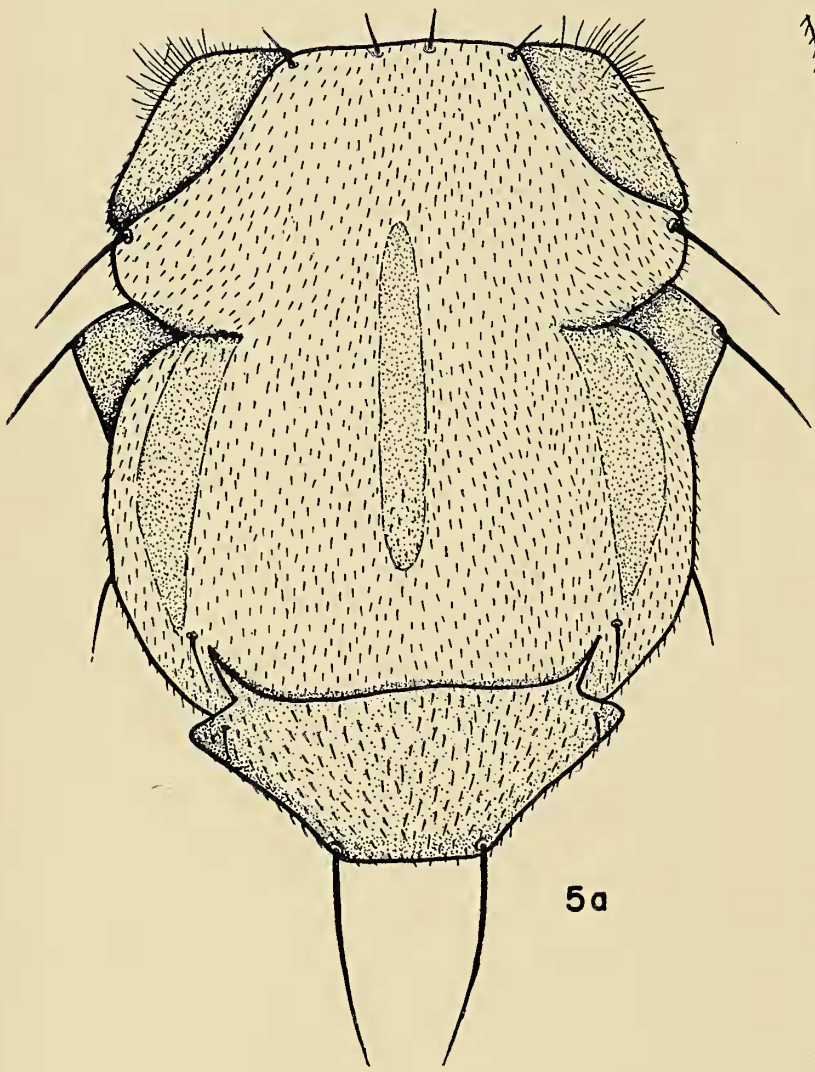
Dacus signatifer Tryon 1927. Roy. Soc. Queensland, Proc. 38: 210–211.

This species very closely resembles *Dacus* (*Austrodacus*) *cucumis* French. The series of specimens at hand had been placed under *D. cucumis* until a more careful study showed that they were quite unrelated species. In body coloration they are almost exactly like *cucumis*. They differ strikingly from this by having only two developed scutellar bristles, by having cilia on the third abdominal tergum of the male, and by having a supernumerary lobe developed in the male wing. The specimens are slightly smaller in size than those of *cucumis*, the female ovipositors are very different in development (Figs. 3*c* and 5*c*), and there is a difference in the chaetotaxy of the head, in the shape of the scutellum, and in some other details. The species is readily separated from *D. murrayi* (Perkins) by the presence of the median yellow vitta, the absence of distinct black bands or vitta on the abdomen, the narrower costal band, and the differences in the female ovipositors.

This species appears to represent another borderline case which shows definite intergradations toward, or into, some of the related subgenera (genera of other authors). The specimens have rudimentary and inconspicuous secondary scutellar bristles. These are scarcely differentiated from the small setae of the scutellum and perhaps cannot correctly be called bristles. They arise in the spots where the second pair of scutellars is located in some other subgenera. They are erect, are borne on raised tubercles, and in some specimens are several times larger than the other setae (Fig. 5*a*). From the original description it would appear that this species should fit in the subgenus *Austrodacus*, but, after a thorough study of a large series of specimens, I feel that it should be placed in *Daculus*.

MALE: Entirely reddish-yellow except for the black facial spots and for a brown to black spot in the middle of the fifth tergum of the abdomen. *Head*: The facial spots are large and conspicuous; they are almost circular and extend to near the oral margin. The vertical bristles are black; the inferior fronto-orbital bristles vary from yellow-brown to blackish. The other head bristles and hairs are pale in color. The gular bristles are not differentiated from the other hairs of the gular area. Two pairs of inferior fronto-orbital bristles are present. The superior fronto-orbitals are rather poorly developed. The front is about one and one-half times longer than wide and is not spotted or noticeably discolored. The antennae are entirely pale colored and are comparatively





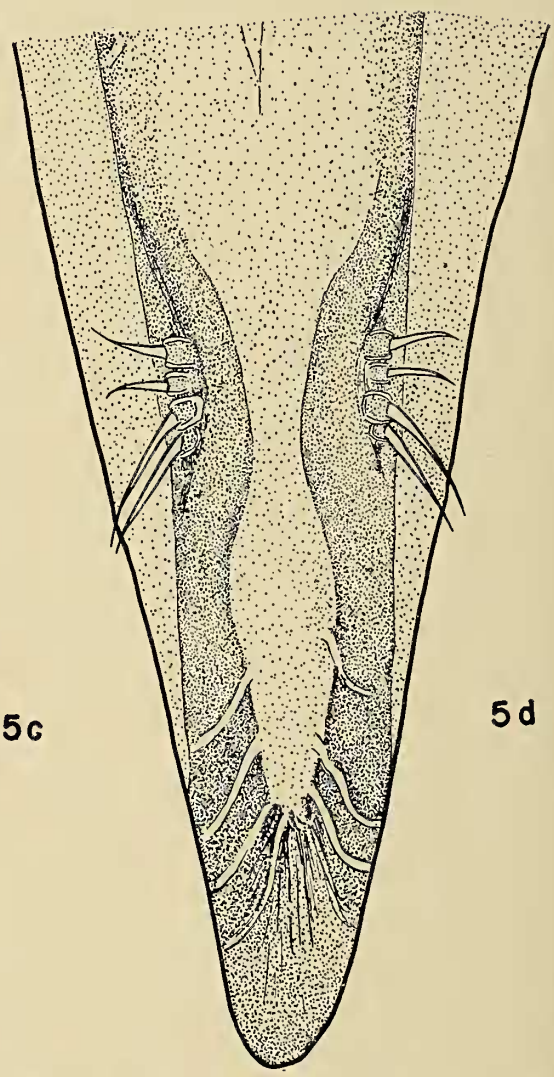


FIG. 5. *Dacus* (*Daculus*) *signatifer* Tryon: a, thorax, dorsal view; b, wing of male; c, female ovipositor, full length; d, apex of ovipositor.

short. The third segment is slightly shorter than the face and is scarcely over three times longer than wide. *Thorax*: Entirely pale colored; the three mesonotal vittae, the humeri, scutellum, notopleura, metapleura, and portions of the sternopleura and mesopleura are differentiated from the remainder of the integument by being lighter in color (cream instead of reddish-yellow). The median vitta on the mesonotum extends from a point about opposite the outer post-alar bristles to a point opposite the hind margin of the humeri. The median vitta is broad in the basal portion and somewhat narrowed anteriorly (Fig. 5*a*). The inner post-alar bristles are poorly developed compared to the outer pair; they are scarcely one-half as large. The halteres are pale yellow. The scutellum is strongly

tapered, narrow, and truncate at its apex. *Legs*: Entirely yellow; the spurs of the middle tibiae are comparatively short, their length about equal to the width of the tibia. *Wings*: Chiefly hyaline, with a distinct costal and cubital band. The first two sections of the costa are faintly yellow-fumose and are devoid of microtrichia except for the apical part of the second section. The costal band is brownish, narrow, and confined to a thin strip which does not extend into cell R_3 except at the apex. The costal band extends, at least faintly, almost to the tip of vein M_{1+2} (Fig. 5*b*). The yellowish cubital streak is broad at its base, filling all of the base of cell M_4 nearly to the top edge of the m–cu crossvein. The yellow streak fades out at about the apex of the cubital cell and joins the gray spot caused by the longer, more closely spaced microtrichia along vein Cu_1+1st A and in the apical portion of cell 1st A. The apex of vein M_{3+4} possesses a gray, faintly yellowish spot formed by the closely set hairs. The cubital cell is strongly narrowed and is elongated. The narrowed portion of this cell is over three times longer than the distance from the apex of this cell to the wing margin. *Abdomen*: Pale yellow, except for the oblong brown to black spot in the middle of the fifth tergum and for the whitish hind border of segment 2. The pile is pale except for the long black hairs on the sides of the third tergum.

Length: Body, 4.7–5.0 mm.; wings, 4.4–4.7 mm.

FEMALE. The cubital streak is not developed beyond the apex of the cubital cell. This cell is much shorter and not as narrow as in the male. The narrowed portion of the cell is one and one-half times longer than the distance from the apex of the cell to the wing margin. *Ovipositor*: Yellow and short, scarcely extruded farther than the length of the fifth tergum. The basal section of the ovipositor is about equal in length to the fifth tergum. The ovipositor is comparatively short and broad (Fig. 5*c*); the entire length (when mounted) is about 3.7 mm. The piercer is approximately 1.1 mm. long by about 0.17 wide. It is broadly tapered toward the apex, and the setae are quite distantly spaced from the apex (Fig. 5*d*). The setae are about 0.1 mm. from the apex. This distance is comparable to four times the length of the longest (distad) pair of setae. The apex of the oviduct is about 0.22 mm. from the tip of the ovipositor. The inversion membrane (segment 8) is 1.3 mm. long by 0.33 mm. wide at its broadest point. The rasper extends to within 0.4 mm. of the base of the segment. The basal segment of the ovipositor is about 1.35 mm. long by 1.0 mm. wide, and the spiracles are about 0.45 mm. from the base of the segment measured on the lateral margins.

Length: Body, 4.8–6.0 mm.; wings, 4.5–5.7 mm.

TYPE LOCALITY: Bowen, Queensland, ex *Capparis laurifolia*.

Type No. 3135 in the Queensland Museum.

A large series of specimens has been studied from Ellis Beach near Cairns, Queensland, Jan., 1950, ex *Capparis lucida*; and from Mowbray River, Queensland, ex *Capparis lucida*, Feb., 1950.

DACUS (GYMNODACUS) Munro

Dacus (*Gymnodacus*) Munro 1938. Roy. Soc. Lond., Proc., Ser. B., Tax. 7(5): 117.

This subgenus is identical with *Dacus* (*Asiadacus*) except that the males have no supernumerary lobe in the wings. It has previously been known only from one African species, the genotype. As a result of the studies reported here, it is quite apparent that two of the Pacific species, *D. absonus* (Hering) and *D. calophylli* (Perkins and May), which were ascribed to the subgenus *Asiadacus*, actually belong in the subgenus *Gymnodacus*. These two are definitely borderline cases linking the two groups, but the lack of development of the supernumerary lobe in the wings of the male places them more closely into *Gymno-*

dacus. *Asiadacus absonus* Hering (1941) shows but a slight indication of a supernumerary lobe, and no distinct lobe is developed in *Asiadacus calophylli* Perkins and May. The males of these two species also lack the long shaggy pile along vein Cu_1+1st A and the spot of very densely placed microtrichia in the upper apical portion of the anal cell which is characteristic of species in those groups which have a well-developed supernumerary lobe.

GENOTYPE: *Dacus mesomelas* Bezzi (syn. *aethiopicus* Munro).

KEY TO KNOWN PACIFIC AND ORIENTAL SPECIES OF *Gymnodacus*

Crossveins r–m and m distinctly infuscated; costal band not continuous, interrupted in cell R_2 (Burma) . . . . . *absonus* (Hering)

Crossveins not infuscated; costal band rather broad, not interrupted (Australia) . . . . *calophylli* (Perkins and May)

Dacus (Gymnodacus) calophylli (Perkins and May)

Fig. 6*a*, *b*

Asiadacus calophylli Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 16–18.

This is the only known Australian species of *Gymnodacus*. It is easily separated by the characters given in the above key. The following are the more important characteristics.

MALE. *Head*: The front is about two times longer than wide and is not distinctly spotted on the sides. Two pairs of inferior frontoorbital bristles are present. The third antennal segment is brownish and is comparatively short. It is just slightly longer than the face and only three times longer than wide. The facial spots are comparatively inconspicuous, small, and elongate in shape. The spots are brownish-black and are about three times longer than wide. *Thorax*: Mesonotum largely black, with the usual yellow markings; a spot just inside each humerus is reddish. The scutellum is yellow except for a very narrow black line across its base. The yellow vertical stripe on the mesopleura expands broadly on the dorsal half of the sclerite and extends anteriorly to a point opposite the anterior notopleural bristle. *Legs*: Yellow to rufous except for the brownish hind tibiae. *Wings*: The first two costal cells are hyaline to faintly yellowish-fumose and are nearly devoid of microtrichia except in the apical half of the second cell. The costal band is rather broad and fills nearly all of cell R_3. The cubital streak is not well developed, does not extend past the apex of the cubital cell, and is confined inside the cubital cell except for a small portion in the base of cell M_4. The narrowed portion of the cubital cell is very short, being only about three-fourths as long as the distance from the apex of the cell to the wing margin. There are no long shaggy hairs along vein Cu_1+1st A as are present in males which have a well-developed supernumerary lobe, and no distinct lobe is present at the apex of vein Cu_1+1st A; just a slight undulation is present in the wing margin. *Abdomen*: Perkins and May (1949) said the abdomen is "almost entirely dark brown to black except for median portion of fourth and fifth tergites which may be fulvo-ferrugineus." In the large series of specimens at hand the abdomen is predominantly rufous. The third tergum has a broad black basal band; a median black vitta extends through the third to fifth terga. A subbasal black band is present on the second tergum, and the first is brown to black on its basal half.

Length: Body, 5.0–5.5 mm.; wings, 4.5–5.0 mm.

FEMALE. In Perkins and May's figure (1949: 18) the narrowed portion of the cubital cell is shown as being longer than the distance to the wing margin beyond the apex. In the specimens at hand this latter distance is one and one-third greater than the length of the narrowed portion of the cubital cell. *Ovipositor*: In *in situ* specimens it is short and inconspicuous; the visible portion is not as long as the fifth tergum. The extended ovi-

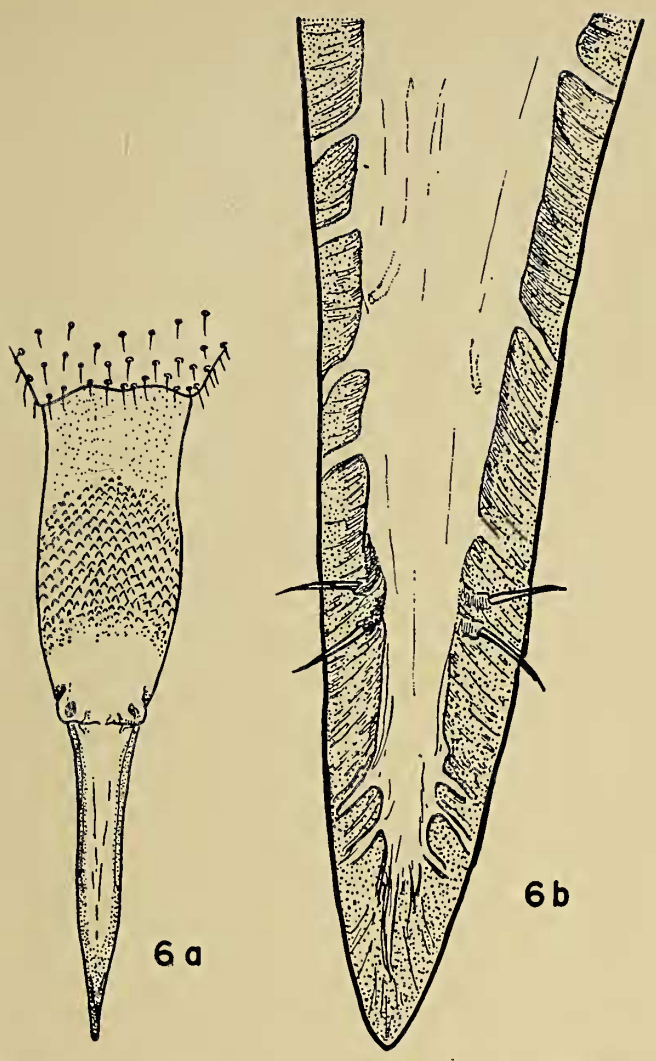


FIG. 6. *Dacus* (*Gymnodacus*) *calophylli* (Perkins and May): a, female ovipositor, full length; b, apex of ovipositor.

positor (Fig. 6*a*) is just slightly over 3 mm. in length. The piercer is about 1.0 mm. long by 0.13 mm. at its widest point. It is constricted at its base (Fig. 6*a*) and gradually tapered beyond the middle. The oviduct ends at about the apical two-thirds of the piercer, a distance of approximately 0.34 mm. from the apex. The setae are inconspicuous (Fig. 6*b*) and are situated 0.05 mm. from the apex of the piercer. The inversion membrane is just slightly over 1 mm. in length by 0.3 mm. in width. The scales of the rasper are sharp pointed and extend to within 0.22 mm. from the base of segment 8. The basal segment is about 1.1 mm. long, and the spiracles are approximately 0.3 mm. from the base of the segment.

TYPE LOCALITY: Cairns, Queensland, ex *Calophyllum inophyllum* Linn.

Type at the University of Queensland.

Several hundred specimens were received from Krauss, collected at Cairns, ex *Calophyllum inophyllum*, June–Sept., 1949.

DACUS (HEMIZEUGODACUS) n. subgen.

The species at hand represents a borderline group which shows definite linkage with other subgenera (genera of authors). Following the concepts of other writers this group would constitute a distinct genus. Variations in the specimens of *D.* (*Hemizeugodacus*) *algaiae* n. sp. in the Krauss collection illustrate clearly, as do many other similar cases which have come to light during studies of large numbers of Dacinae, that various chaetotaxic characters which have been given generic importance are of not more than subgeneric value.

Dacus (*Hemizeugodacus*) is related to the subgenus *Parazeugodacus* Shiraki because of the presence of four scutellar and two prescutellar bristles, the presence of cilia on the third abdominal tergum of the male, and the lack of a distinct supernumerary lobe in the wings of the male. It differs from *Parazeugodacus* and related subgenera by lacking the anterior supra-alar bristles. In one specimen at hand a tiny rudimentary anterior supra-alar bristle is present on the left side, showing definite intergradation toward *Parazeugodacus*. In all other specimens studied, both anterior supra-alar bristles are completely lacking. In many respects *Hemizeugodacus* is similar to *Afrodacus*, but differs by having the four well-developed scutellar bristles and by lacking the supernumerary lobe in the wings of the males. It is also very similar to *Austrodacus* but differs by having prescutellar bristles and by having cilia on the third abdominal tergum of the male. *Hemizeugodacus* differs from *Zeugodacus* by lacking the anterior supra-alar bristles and by the poorly developed supernumerary lobe in the male wing; however, the shaggy hairs and closely set microtrichia are present.

GENOTYPE: *Dacus* (*Hemizeugodacus*) *algaiae* n. sp.

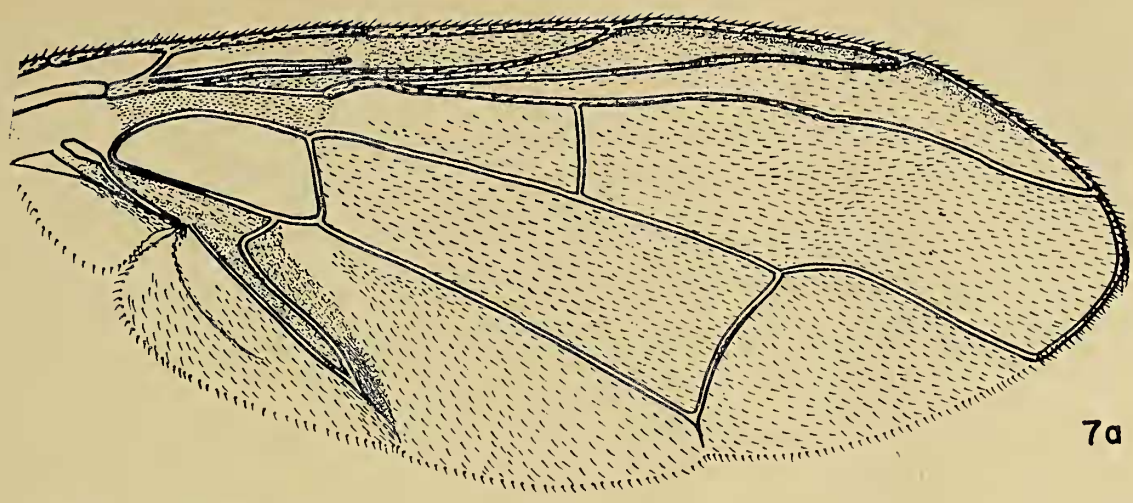
Dacus (Hemizeugodacus) algaiae n. sp.
Fig. 7*a–c*

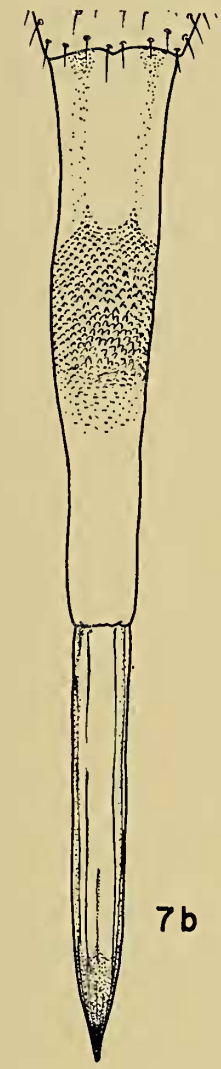
This species very closely resembles *Dacus* (*Austrodacus*) *cucumis* (French). It is best separated by the subgeneric characters just mentioned and by the very faint costal band, the median longitudinal vitta down the abdomen, the more elongate antennae, and by the differences in the female ovipositor. Superficially the species is very similar to *D.* (*Zeugodacus*) *atrisetosus* (Perkins), but the latter has well-developed anterior supra-alar bristles.

MALE. Entirely pale reddish to yellow except for the black facial spots and the brown to black vitta down the abdomen. *Head:* Front comparatively narrow, just two times longer than wide. The front is entirely rufous except for a faint brownish discoloration in the median portion. There are two pairs of inferior fronto-orbital bristles, the lower pair spaced about their length from the oral margin. All of the head bristles are pale reddish-yellow except for the brownish tinged fronto-orbitals. The antennal grooves have a conspicuous row of short yellow hairs extending their entire length. The facial spots are suboval, longer than wide, and conspicuous. The third antennal segment is brownish tinged, slender, and elongate (for a *Dacus*); it is one and one-third longer than the face and its greatest width is equal to slightly less than one-fourth its length. *Thorax*: With three postsutural yellow vittae which extend from the suture to a line running between the lower pair of post-alar bristles. The median vitta is broad, is somewhat narrowed in the anterior part, and broadened behind. At its widest point it is almost equal to the distance between the prescutellar bristles. The lateral vittae are narrow, about half as wide as the median. The scutellum, humeri, notopleura, and the usual pale areas of the pleura are clear yellow. The halteres are yellow. The bristles of the thorax are yellow-red in color. *Legs*: Entirely yellow to rufous. The apical spurs of the middle tibiae are reddish, the length of the spurs is equal to about two times the greatest width of the tibiae. *Wings*: Faintly fumose as seen in reflected light, often with broad, faintly yellowish bands along all of the veins and crossveins. The costal band is faintly brownish and inconspicuous beyond the fourth costal section. The band is narrow and does not extend below vein R_3 except at its apex. The first two sections of the costa are yellowish-fumose. The first section is devoid of microtrichia except along the top margin. The second section is chiefly filled with microtrichia. The cubital streak is pale brown, fills all of the basal portion of cell M_4 to the base of the m–cu crossvein, but fades out before it reaches the wing margin (Fig. 7*a*). The narrowed portion of the cubital cell is slightly less than two times longer than the distance from the apex of cell Cu to the wing margin. A slight undulation is present in the wing margin at the apex of vein Cu_1+1st A, but no distinct lobe is present. *Abdomen*: With no dark-colored crossbands and with the longitudinal median vitta extending almost the full length of the abdomen fading out on the second tergum. The lateral hairs of the third tergum are reddish.

Length: Body, 6.2 mm.; wings, 5.9 mm.

FEMALE. The brownish-yellow cubital streak ends about halfway between the apex of cell Cu and the wing margin. The narrowed portion of cell Cu is about equal in length to the distance from its apex to the wing margin. The abdomen is similar to that of the male but lacks the cilia on the third tergum. The ovipositor is reddish-yellow, often tinged with brown. *Ovipositor*: The ovipositor is not conspicuous in undissected specimens; the visible portion is about equal in length to the fifth abdominal segment. The entire ovipositor, about 4.6 mm. in length, is comparatively short (Fig. 7*b*). The piercer (Fig. 7*c*) is 1.5 mm. long by about 0.3 mm. wide and is gradually tapered beyond the apex of the oviduct. The tip of the oviduct is about 0.23 mm. from the apex of the ovipositor. There





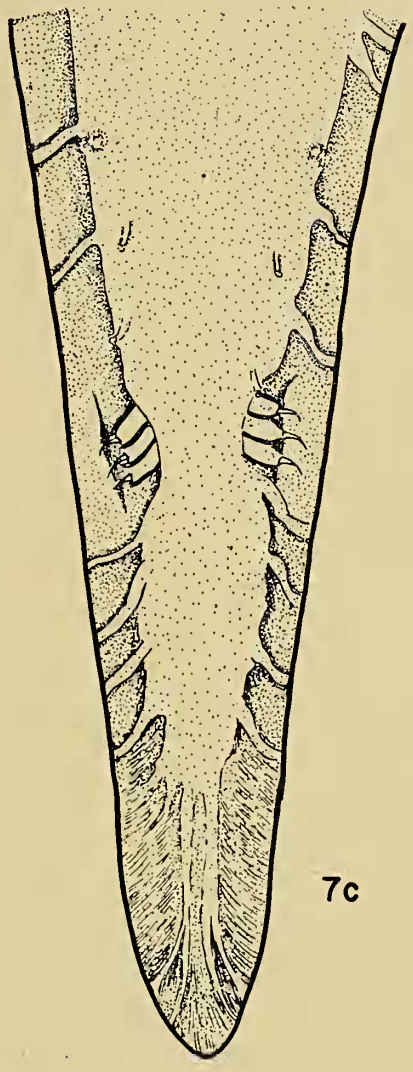


FIG. 7. *Dacus* (*Hemizeugodacus*) *algaiae* n. sp.: a, wing of male; b, female ovipositor, full length; c, apex of ovipositor.

are no apparent preapical setae as in other Dacinae. Under high-power magnification it appears that there are three pairs of very tiny setae located about 0.09 mm. from the apex of the ovipositor. In the specimens studied these could not be clearly defined even under oil immersion. The inversion membrane (segment 8) is about 1.7 mm. long by 0.3 to 0.4 mm. wide at the broadest point. The rasper extends to within about 0.58 mm. from the base of the segment. The scales of the rasper are blunt, mostly rounded at their apices, and not drawn out into points. The basal segment of the ovipositor is about 1.4 mm. long by about 1.0 mm. wide at its broadest point. The spiracles are about 0.5 mm. from the base of the segment.

Length: Body, 6.2–7.0 mm.; wings, 5.9–6.6 mm.

Holotype male, allotype female, and 18

paratypes (10 males and 8 females): Atherton Tableland, Queensland, Nov., 1949, ex *Aglaia ferruginea*. Also, two paratype females: near Atherton, Queensland, Feb., 1950, ex *Aglaia sapindina*.

Holotype, allotype, and four paratypes have been deposited in the United States National Museum. The remainder of the paratypes are being distributed to the following museums and individual collections: Australian Museum, Sydney, Australia; Bishop Museum, Honolulu, T. H.; Board of Agriculture and Forestry, Honolulu, T. H.; Hawaiian Sugar Planters' Association, Honolulu, T. H.; University of Hawaii, Honolulu, T. H.; the collection of Dr. H. K. Munro, Pretoria, South Africa; and the collection of Dr. M. Hering, University of Berlin.

Dacus (Heterodaculus) n. subgen.

This subgenus is very closely related to *Dacus* (*Daculus*) but is differentiated by the lack of the supernumerary lobes in the wings of the males. If the generic concepts used by various other workers in this group were followed, this difference would justify setting up a new genus for the species at hand. I am not in favor of this procedure and prefer that genera not be based upon secondary sexual characters unless accompanied by ample supporting characters, preferably characters common to both sexes. The wing venation is considerably different from that of known species of the subgenus *Daculus*, and, on the basis of a comparison of *Dacus* (*Heterodaculus*) *visendus* n. sp. with the described species of the subgenus *Daculus*, it would appear that they should be placed in different genera. However, on the basis of a broad comparative study of the characters throughout the subfamily Dacinae, these characters do not appear to be of more than subgeneric importance. The variations and intergradations of the intrageneric characters of the genus *Dacus* sens. lat. encompass the structural differences seen in the species at hand.

Aside from the secondary sexual characters mentioned above, the subgenus differs from *Daculus* and other closely related subgenera by having the r–m crossvein situated below the middle of the discal cell. The section of cell R from the fumose portion (directly above the base of vein M_{3+4}) to the r–m crossvein is very short compared to the same section in *Daculus* and most other *Dacus*. This portion of cell R is slightly shorter than cell M (Fig. 8*c*). In all the known species of *Daculus* and almost all known species of *Dacus* the r–m crossvein is situated beyond the middle of the discal cell, and the apical portion of cell R (beyond the fumosity) is about one and one-half times longer than cell M (Fig. 5*b*). In *Heterodaculus* the apex of vein R_{1+2} is well beyond a point opposite the r–m crossvein; the top of the crossvein is almost opposite the middle of the third section of the costa. In *Daculus* and other *Dacus*, with a few exceptions, the top of the r–m crossvein is about opposite the apex of vein R_{1+2} and the bottom is slightly beyond its apex. At least three species of *Dacus* (*Strumeta*)—*recurrens* (Hering), *pulcher* (Tryon), and *manskii* (Perkins and May)—have the r–m crossvein located in this more anterior position, so this would probably not be a valid generic character. The apical portion of vein M_{3+4} is more elongate and the lower corner of cell 1st M_2 is farther from the wing margin than in other *Dacus* species which I have studied. The vein reaches four-fifths of the distance to the wing margin, and the distance from the lower corner of cell 1st M_2 to the margin is equal to about one-third the length of the m crossvein. The head possesses three to four pairs of inferior fronto-orbital bristles. A pair of small but conspicuous postocellar bristles is also present.

GENOTYPE: *Dacus* (*Heterodaculus*) *visendus* n. sp.

Dacus (Heterodaculus) visendus n. sp.

Fig. 8*a–e*

This species is distinguished from other Dacinae by the characteristics discussed just above. The pattern of the wing maculation will readily separate it from all other known species.

MALE. *Head:* Entirely yellow, tinged with reddish, except for the moderately large oblong black facial spots and for a dark brown spot just below the lower margin of each eye. The facial spots are about two times longer than wide and extend to near the oral margin. The vertical bristles are very well developed and are black in color. The other head bristles are brown, except for the yellow gular bristle and the yellow postoccipital row. The front is parallel sided and two times longer than wide. (Fig. 8*a*). The slightly raised median portion of the front between the inferior fronto-orbital bristles is discolored with brown to black, and the area around the bases of the superior fronto-orbital bristles is often brown. The inferior fronto-orbitals vary in number from three to four pairs; the average specimens have three pairs. The face is slightly convex on the upper portion with an indentation or indistinct transverse groove across the middle. The lower portion of the face is straight. The third antennal segment is dark brown to blackish and is distinctly longer than the face. The third segment is not, however, conspicuously elongated; it is just slightly more than four times longer than wide. *Thorax:* Predominantly yellow-red in ground color with some dark patterns on the mesonotum and the pleura. As is typical of the subgenus the scutellum has but one pair of bristles; the prescutellar and anterior supra-alar bristles are lacking. The scutellum is entirely pale yellow except for a narrow reddish-brown band at its base. The mesonotum has three postsutural yellow (or cream) vittae. The two lateral vittae are comparatively short and end one-third to nearly one-half their length from the posterior supra-alar bristles. The median vitta is two or more times wider than the laterals, it extends from the suture almost to the scutellum, and is broadest at its base and gradually narrowed anteriorly. The humeri, notopleura, and portions of the mesopleura, sternopleura, and metapleura are pale yellow. The yellow markings of the mesopleura extend broadly along the dorsal margin of the sclerite and connect with the humeri (Fig. 8*b*). The dark pattern of the mesonotum is rather irregular and appears to be somewhat variable. In general there is a dark line on each side, extending just inside the lateral yellow vittae from the outer scapular bristles to a line opposite the posterior supra-alar bristles. Just in front of the suture these marks expand laterally and extend toward the bases of the anterior notopleural bristles. The metanotum is dark brown to black on the sides and is tinged with rufous in the median portion. The halteres are yellow. *Legs:* Entirely yellow, except for the brown to blackish hind coxae and tibiae and the slightly discolored apical subsegments of the tarsi. *Wings:* Conspicuously marked by a variable pattern which extends transversely through the middle of the wing. The costal band is yellow-brown to yellow-gray. The band extends through all of cell R_3, except for a portion of this cell lying directly below the apex of vein R_{1+2}. The band is faint, but distinct, in cell R_3 and does not extend noticeably beyond the tip of vein R_{4+5}. The first two sections of the costa are yellowish-fumose and are densely covered with microtrichia except for the anterior half of the first section. The cubital streak is very broad and conspicuous; it fills the basal portion of cell M_4 but does not extend to the top margin of the m–cu crossvein. The brownish streak extends almost to the apex of vein Cu_1+1st A. The area along vein Cu_1+1st A, on the underside of the wing has the usual long matted microtrichia and the large gray spot which extends through the apex of the 1st anal cell. This area is not as conspicuously darkened or hairy as in the *Daculus* which have been studied. An irregular, yellow-brown-

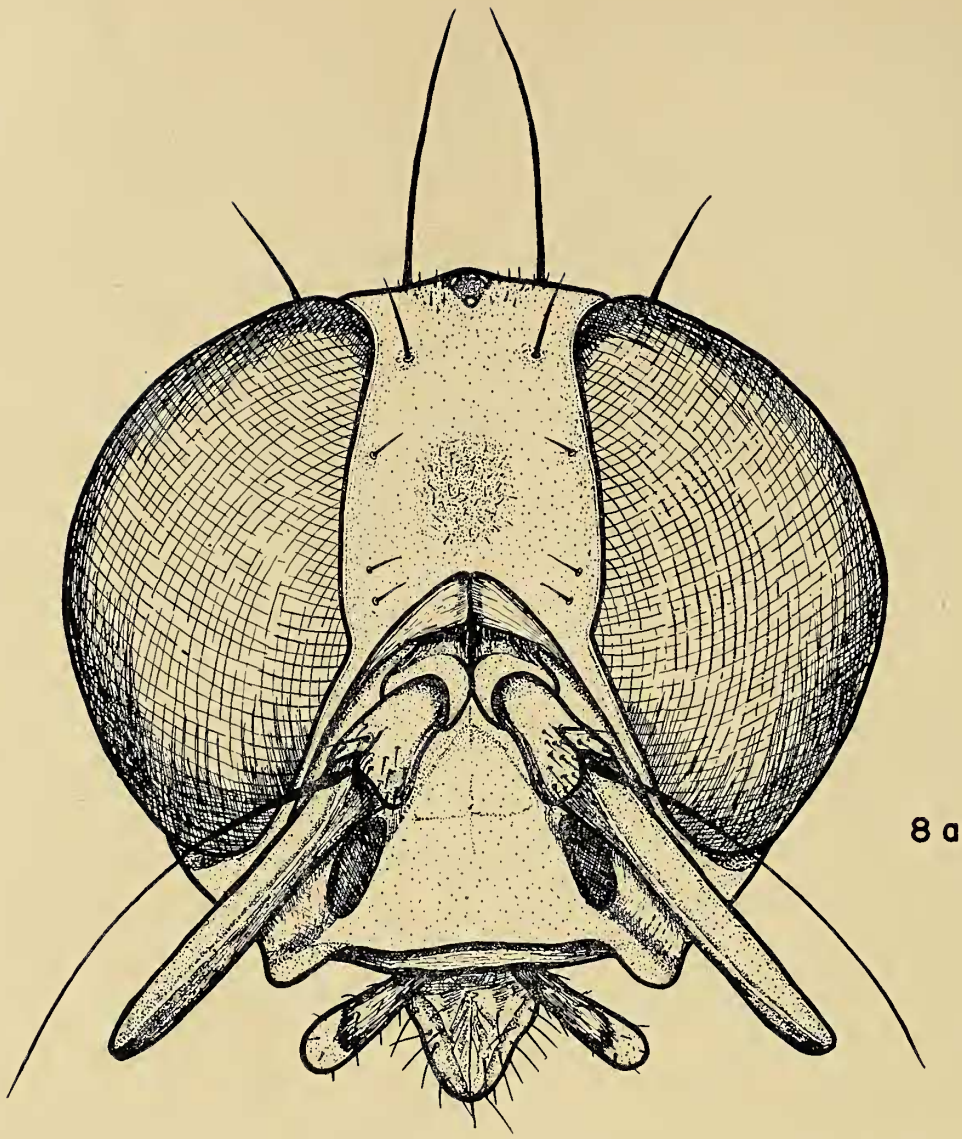
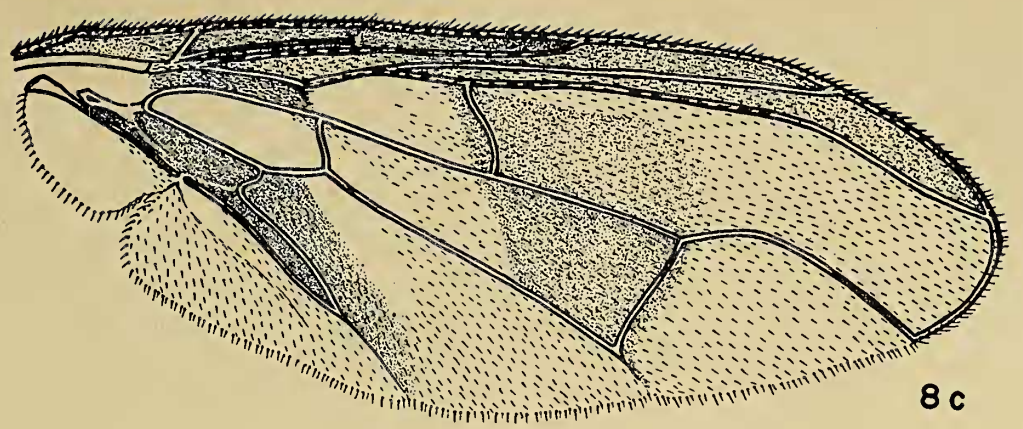
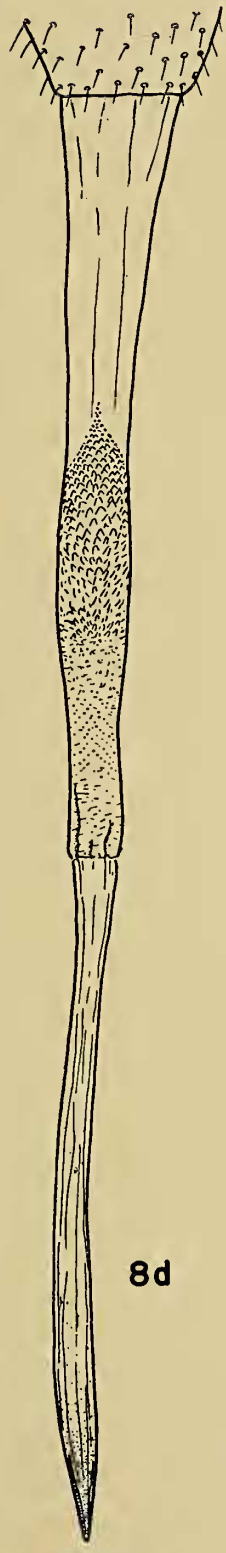


FIG. 8A. *Dacus* (*Heterodaculus*) *visendus* n. sp.: a, head; b, thorax, lateral view,

fumose streak extends through the middle part of the wing from the costal band opposite the r–m crossvein to the apex of vein M_{3+4}. This band extends broadly over the r–m crossvein, along vein M_{1+2} from just before the r–m to the m crossvein, and along





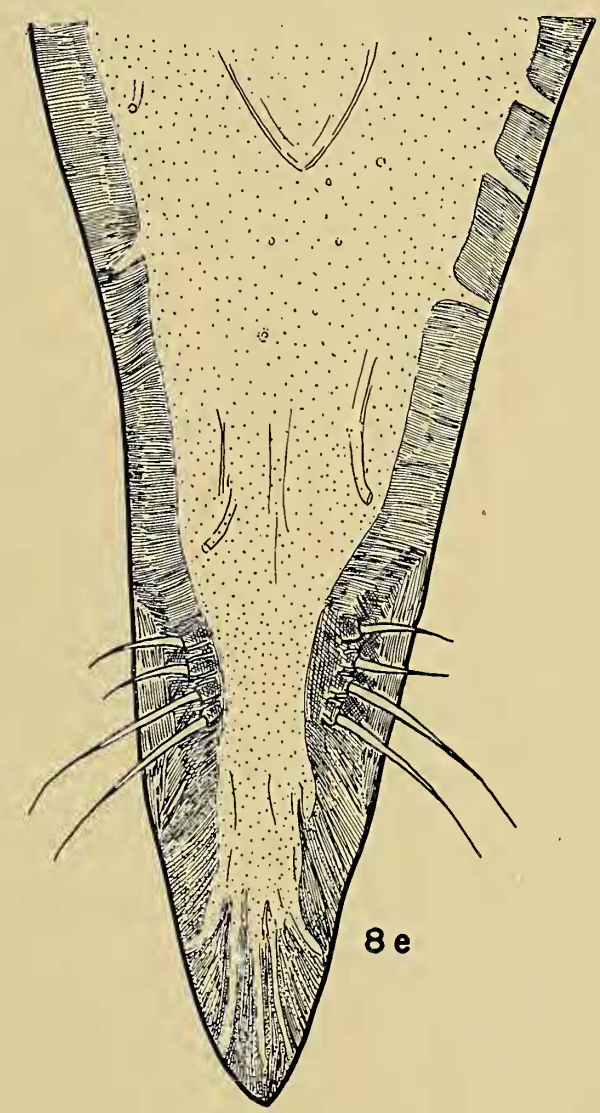


FIG. 8B. *Dacus* (*Heterodaculus*) *visendus* n. sp.: c, wing of female; d, female ovipositor full length; e, apex of piercer.

the inside margin of the m crossvein. Usually the apical third of the discal cell (1st M_2) is almost completely fumose (Fig. 8*c*); in some specimens the fumosity extends just along the crossveins and along the middle part of vein M_{1+2} in a Z-shaped pattern. The por-

tion of cell R directly above cell M is very densely covered with microtrichia. In the outer portion of this area, just above vein M, the microtrichia appear to be longer and more dense. The cell is dark brown to black in this portion. The wing shows a very slight undulation at the apex of the vein Cu_1+1st A, but there is no developed lobe at this point. Vein Cu_1+1st A fades out before the wing margin. The distance from the apex of the cubital cell to the wing margin is slightly more than half the length of the narrowed portion of cell Cu. *Abdomen:* Chiefly yellow to rufous in the median portion of the dorsum and brown to blackish on the sides. The first tergum is almost entirely dark colored, with just a narrow yellow apical margin. The second tergum has a broad dark-colored band across its base and the apical half is yellow to whitish. The third and fourth terga have a broad yellowish band extending longitudinally down the middle. This extends over the fifth tergum and expands laterally to cover all of that sclerite except for narrow black lateral margins. The third tergum has a row of long black hairs on each side.

Length: Body, 6.5 mm.; wings, 5.7 mm.

FEMALE. Very similar to the male except for the sexual characters. The cubital streak is equally well developed but the longer, more closely arranged microtrichia are not present along vein Cu_1+1st A or in the 1st A cell. The narrowed portion of cell Cu is shorter than in the male. This portion is about one and one-third longer than the distance from the apex of cell Cu to the wing margin. *Ovipositor:* Yellow-red and rather conspicuous. In the majority of specimens the extruded ovipositor (*in situ*) is equal in length to the last three abdominal segments (3–5). The basal portion (segment 7) is one and one-third longer than segment 5. The ovipositor is rather long and slender when relaxed and when extended (Fig. 8*d*) it measures approximately 6.4 mm. The piercer measures about 2.1 mm. long by 0.18 mm. at its widest point. The apex of the oviduct is comparatively near the tip of the ovipositor (0.15 mm.) and the piercer is gradually tapered beyond this point (Fig. 8*e*). The four pairs of subapical setae are about 0.05 mm. from the apex of the piercer, about two times the length of the longest (distad) setae. The inversion membrane (segment 8) is about 2.4 mm. long by 0.3 mm. wide at its broadest point. The rasper extends to about 1.0 mm. from the base of the segment. The basal segment (seventh) is approximately 1.9 mm. long by 1.4 mm. wide, measured across the anterior margin. The spiracles are located about 0.5 mm. from the base of segment 7, measured on the lateral margins.

Holotype male, allotype female, and 100 paratypes (55 males and 45 females): Babinda, Queensland, Australia, Jan., 1950, ex *Garcinia kajewskii.*

Holotype, allotype, and eight paratypes deposited in the United States National Museum. The remainder of the paratypes are being distributed among the following museums and collections: Bishop Museum, Honolulu, T. H.; Australian Museum, Sydney; Board of Agriculture and Forestry, Honolulu, T. H.; Hawaiian Sugar Planters' Association, Honolulu, T. H.; and the University of Hawaii, Honolulu, T. H.

DACUS (MELANODACUS) Perkins

Melanodacus Perkins 1937. Roy. Soc. Queensland, Proc. 48(9): 57.

This subgenus is in the *Zeugodacus* complex because of the presence of four scutellar bristles. It differs from *Zeugodacus* by having no cilia on the third tergum of the male. It is closely related to *Paratridacus* Shiraki and is separated by the presence of a supernumerary lobe in the male wing.

Only a single species is known from Australia.

GENOTYPE: *Dacus niger* Tryon.

KEY TO KNOWN SPECIES OF
Dacus (*Melanodacus*)

Face yellow, with the usual black spots (Australia) . . . . . *niger* Tryon
Face entirely black (New Guinea) . . . . . *satanellus* (Hering)

Dacus (Melanodacus) niger Tryon

Fig. 9*a*, *b*

Dacus niger Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 211–212.

This species was not collected by Krauss but a specimen from the Sydney area was sent in by him. It is easily separated from all known Australian Dacinae by its very black coloration, by the absence of yellow vittae on the mesonotum, as well as by the subgeneric characters.

MALE. *Head:* Occiput black except for a narrow yellow margin. The front is over two times longer than wide and with brownish spots on the sides and a brownish discoloration in the median portion. The facial spots are suboval, drawn into a point on the underside. The third segments of the antennae are about one and one-third times longer than the face and nearly four times longer than wide. *Thorax:* Entirely shining black except for the hind three-fourths of the humeri, the notopleural calli, the sides of the scutellum, the metapleura, and the posterior two-thirds of the mesopleura which are yellow; the halteres are also yellow. The mesonotum is very minutely punctulate. *Legs:* Coxae and trochanters brown to black, femora yellow except for brown to black apices of the hind pair. Tibiae yellowish-red tinged with brown; the hind pair is darker in color, sometimes chiefly blackish. The tarsi are yellow, the apical subsegments are brownish tinged. *Wings:* Entirely hyaline except for a brownish stigmal spot and a faint indication of a costal band along the margin in the apex of cell R_3. The cubital streak is not present although the base of the cubital cell is slightly yellowed.

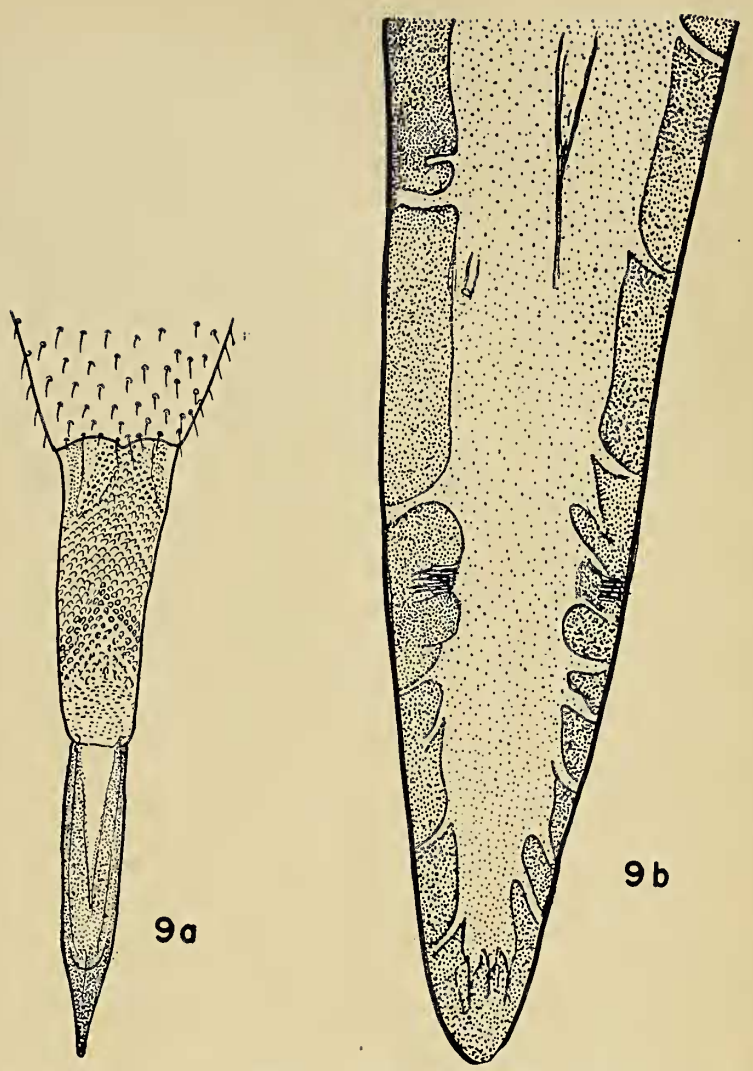


FIG. 9. *Dacus* (*Melanodacus*) *niger* Tryon: a, ovipositor, full length; b, apex of ovipositor.

The narrowed portion of the cubital cell is very short; it is about half as long as vein Cu_1+1st A. *Abdomen:* Strongly narrowed basally, rather oval in shape. Entirely black except for two elongate yellow spots on the hind margin of the second tergum separated by a median black portion. The fifth tergum has a pair of narrow yellow marks extending longitudinally down the middle of the segment separated by a black vitta.

Length: Body, 5.0 mm.; wings, 4.0–5.0 mm.

FEMALE. The narrowed portion of the cubital cell is more elongate than in the male; it is about three-fourths as long as vein Cu_1+1st A. *Ovipositor:* The basal segment is black, the remainder is reddish. In *in situ* specimens the visible portion of the ovipositor is about one and three-fourths times longer than the fifth tergum. The extended ovipositor is very short (Fig. 9*a*), being approximately 3.0 mm. long. The piercer and the inversion membrane are both about 1.0

mm. long. The piercer (Fig. 9*b*) is about 0.16 mm. wide and the eighth segment is 0.25 mm. wide. The oviduct opens at the apical two-thirds of the piercer, about 0.3 mm. from the apex. The setae are very tiny and inconspicuous; they are about 0.06 mm. from the tip of the piercer. The scales of the rasper are blunt and extend to the base of the eighth segment. The basal segment of the ovipositor is about 1.1 mm. long by 0.9 mm. wide; the spiracles are about 0.28 mm. from the base of the segment.

TYPE LOCALITY: Cleveland, South Queensland, ex *Symplocos thwaitesii* F.v.M.

Type in the Queensland Museum.

One female specimen was sent in by Mr. Krauss labeled "in trap, St. Ives, near Sydney, Oct. 29, 1941." (Collector not given.)

DACUS (PARATRIDACUS) Shiraki

Paratridacus Shiraki 1933. Fac. Sci. Agr., Taihoku Imp. Univ., Mem. 8(2): 109–110.

This subgenus is closely related to *Dacus* (*Zeugodacus*) and is distinguished only by secondary sexual characters. The males differ by having no cilia on the third abdominal tergum and no supernumerary lobe in the wing. The group apparently contains but one species; it is widely distributed and quite variable in coloration.

GENOTYPE: *Dacus* (*Paratridacus*) *expandens* Walker.

Dacus (Paratridacus) expandens Walker

Fig. 10*a*, *b*

Dacus expandens Walker 1859. Linn. Soc. Lond., Proc. 3: 114.

Bactrocera garciniae Bezzi 1913. Ind. Mus. Mem. 3: 97–98. New synonymy based upon a large series of specimens from a wide range of localities and upon a comparison of specimens with the type in the British Museum.

Dacus yayeyamanus Matsumura 1916. Thousand Insects of Japan, Addit. 2: 412. New synonymy based upon a comparison of specimens from Japan with specimens from numerous other areas.

This is a moderately large, chiefly pale-colored species which is distinguished from all known Dacinae by the subgeneric characters stated above. The females are also distinctive because of their peculiarly developed ovipositor (Fig. 10*b*). The coloration is apparently quite variable and does not appear to be reliable as a specific character. The specimens on hand from Australia are quite consistently pale colored. None in the series at hand has black markings on the mesonotum, and the abdomen and legs are not as distinctly marked with black as in specimens from the Philippines, Japan, and some other regions.

MALE. The front is nearly one and three-fourths times longer than broad and is slightly discolored with brown in the median part at the bases of the bristles. There are normally two pairs of inferior fronto-orbital bristles; one specimen at hand has four well-developed inferior fronto-orbitals on one side of the face and two on the other. The facial spots vary in size and shape from small and circular to rather large oval to subquadrate. The third antennal segment is brown, one and one-third times longer than the face, and nearly five times longer than wide. *Thorax:* Typically rufous, except for the two yellow postsutural stripes, yellow humeri, and the usual yellow markings. The scutellum is normally yellow but is discolored with reddish in some specimens. The mesonotum often has brown to blackish submedian vittae extending longitudinally before and behind the suture. The pleura are usually all pale, but in some specimens the sternopleura, hypopleura, pteropleura, and the front margin of the mesopleura are extensively black. The metanotum varies from yellow to rufous in the center and from brown to black on the sides. *Legs:* Varying in coloration from all reddish to yellow, except for brownish coxae and apical subsegments of tarsi, to having a

brown to black spot on the underside of the apex of each femur, and to having the tibiae tinged with brown. *Wings:* With a broad costal band and cubital streak. In teneral specimens the wing markings are very faint to absent. The first two costal cells are subhyaline to distinctly yellowish. The first cell has microtrichia only in the apical dorsal portion and the second cell is pilose except in the lower basal portion. The costal band extends through cell R_3 to vein R_{4+5}. The cubital streak fills all of the basal part of cell M_4 and extends almost to the top margin of the m–cu crossvein. The streak fades out shortly beyond the apex of the cubital cell and there are no dense, shaggy hairs or closely set microtrichia along vein Cu_1+1st A. The narrowed portion of the cubital cell is about one and one-third times longer than the portion from the apex of the cubital cell to the wing margin. *Abdomen:* Chiefly rufous with a brown to black basal band on the third tergum and a brown to black median vitta extending down terga 3 to 5. The bases of terga 1 and 2 are also brownish; the subbasal band on the second is sometimes black. The median vitta and the basal band on the third are variable. In some specimens, only the posterior lateral margins of the third tergum and the median portion of the fifth are distinctly marked with brown to black.

FEMALE. The narrowed portion of the cubital cell is just slightly longer than the distance from the apex of that cell to the wing margin. *Ovipositor:* Short and inconspicuous in dry specimens. The exposed portion of the ovipositor is shorter than the fifth tergum. In *in situ* specimens the apex of the piercer and its peculiar distinctive shape can usually be seen. The extended ovipositor (Fig. 10*a*) is about 3.0 mm. long. The piercer has a characteristic constriction at its base and its apex is distinctively shaped. The piercer is approximately 1.4 mm. long by 0.19 mm. at its widest point. The oviduct extends to within approximately 0.21 mm. from the apex of the piercer. Slightly beyond the halfway point between the end of the oviduct and the apex the piercer is strongly constricted with a lobe-like projection on each side as in Figure 10*b*. The narrowed apical portion is about 0.08 mm. long. The setae are very inconspicuous and are situated at the basal three-fourths of the narrowed portion, about 0.06 mm. from the apex of the piercer. The inversion membrane is approximately 1.4 mm. in length by 0.7 mm. wide. The scales are broad and blunt and extend to within 0.09 mm. of the base. The basal segment of the ovipositor is about 1.3 mm. long by 1.2 mm. wide and the spiracles are located 0.23 mm. from the posterior lateral margins of the segment.

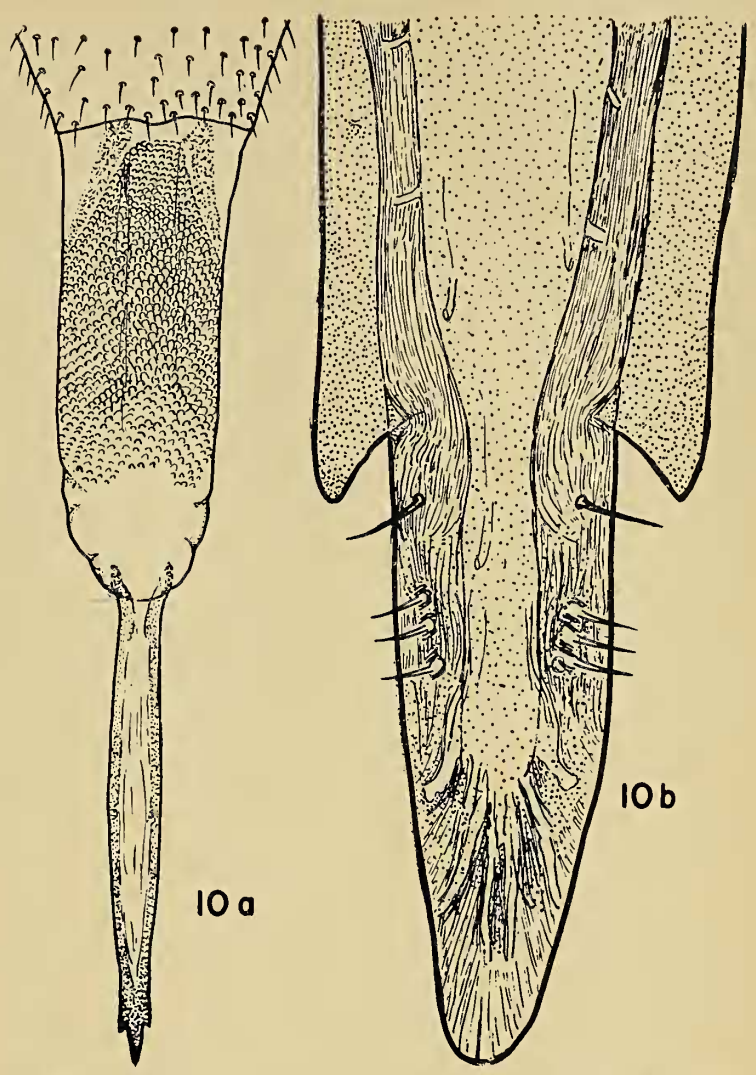


FIG. 10. *Dacus* (*Paratridacus*) *expandens* Walker: a, ovipositor, full length; b, apex of ovipositor.

Length: Body, 8.0–10.0 mm.; wings, 7.5–8.5 mm.

TYPE LOCALITY: "Aru Islands" (Aroe Island).

Type in the British Museum.

Twenty specimens are in the Krauss collection from Cairns, Queensland, ex *Garcinia xanthochymus*, Aug.–Nov., 1949.

This species is apparently widely distributed. I have studied numerous specimens from Japan, the Philippine Islands, Ceylon, and India.

Dacus (Strumeta) Walker

Strumeta Walker 1856. Linn. Soc. Lond., Proc. 1: 33.

Dasyneura Saunders 1841. Ent. Soc. Lond., Trans. 3: 60 (nec Rondani, 1840).

Chaetodacus Bezzi 1913. Ind. Mus. Mem. 3: 93.

Dacus (*Marquesadacus*) Malloch 1932. B. P. Bishop Mus. Bul. 98: 145.

The subgenus *Strumeta* contains the greatest number of species of any of the Australian or Pacific Dacinae. There are 17 species[5] and 3 varieties now known from Australia. All of these were represented in the Krauss collection except *D. bancrofti* (Tryon) and *D. strigatus* (Perkins). The members of this subgenus are characterized by having two scutellar bristles, a pair of prescutellars, and a pair of anterior supra-alars; by having the supernumerary lobe developed in the male wing; and by having a row of cilia on each side of the third tergum of the male.

GENOTYPE: *Dacus umbrosus* Fabricius.

KEY TO KNOWN SPECIES OF *Dacus* (*Strumeta*) FROM AUSTRALIA

1. Wings with one or more transverse markings; at least the r–m crossvein infuscated 19
   Wings marked only with the costal band and the cubital streak 2
2. Scutellum yellow except for a narrow basal margin 4
   Scutellum with a large brown spot covering most of the disc or the apex 3
3. The brown spot on the scutellum extends from the base over most of the disc, margin pale; fifth abdominal segment with a large brown to black spot on each side; mesonotum brownish with no black markings . . . . . *halfordiae* (Tryon)
   The brown spot covers just the apex of the scutellum; abdomen entirely orange, no brown to black markings; mesonotum extensively marked with black . . . *bancrofti* (Tryon)
4. Costal band broad, extending to or slightly below vein R_{4+5}, filling all of cell R_3; female ovipositor as in Figures 13*a* and 13*b* . . . *bryoniae* (Tryon)
   Costal band narrower, extending scarcely, if at all, below vein R_3 except at the wing margin; ovipositor not as above 5
5. The first two costal cells are covered with microtrichia except in the basal half of the first cell; these cells are yellow-brown-fumose, concolorous with the costal band . . . . . (*tryoni* complex) 6
   First two costal cells devoid of microtrichia except in the apex of the second section and rarely a narrow row along top margin of the first; these cells are usually hyaline, distinctly paler than the costal band . 9
6. Humeri concolorous with the notopleural calli and the postsutural yellow stripes 7
   Humeri discolored, faintly to distinctly brownish; not concolorous with the yellow markings of the mesonotum . *tryoni* var. *neohumeralis* n. name
7. Mesonotum without black markings, except sometimes a pair of small black marks near the anterior margin . . . . . *tryoni tryoni* (Froggatt)
   Mesonotum with black vittae, or extensively marked with black 8
8. Predominantly brown to black, melanistic forms, thorax and abdomen

[5] "*Bactrocera longicornis* Guer." cannot be recognized from the original description and is not included in this list. Some writers have considered it a synonym of *D. umbrosus* Fab.

chiefly dark colored.....
...*tryoni* var. *melas* (Perkins and May)
Not so dark colored, intermediate forms, mesonotum with rufous areas separating the black vittae...
.....*tryoni* var. *sarcocephali* (Tryon)

9. Thorax and abdomen entirely pale, with no dark markings; female ovipositor very elongate, the exposed portion longer than the combined lengths of abdominal segments 3 to 5; facial spots produced into a sharp point below.....*fagraeus* (Tryon)
Thorax and (or) abdomen with brown to black markings; ovipositor comparatively short, not as long as segments 3 to 5; facial spots usually oval, not sharp-pointed below.... 10

10. Dorsum of thorax pale, without brown to black markings..... 17
Dorsum distinctly marked with dark brown to black..... 11

11. Dorsum of thorax almost entirely black..... 12
Mesonotum marked with longitudinal dark brown to black lines separated by rufous areas; or with a narrow median black vitta..... 13

12. Abdomen all rufous except for a narrow black band at the base of the third tergum; female ovipositor rather elongate, the visible portion equal to the combined lengths of segments 4 and 5.....*musae* (Tryon)
Abdomen with a broad median vitta extending over terga 3 to 5; sides of terga 3 and 4 blackish; ovipositor short, visible portion about equal to segment 5.....
.....*endiandrae* (Perkins and May)

13. Mesonotum rufous except for a narrow median vitta and a black spot in front of scutellum.....
.....*cacuminatus* (Hering)
Mesonotum without a median vitta.. 14

14. Female ovipositor very short, *in situ* the visible portion is not over one-half as long as the fifth tergum; the costal band is very narrow, not extending beneath cell R_3 except at its apex; vertical stripe on mesopleura broadened on the dorsal portion, extending anteriorly to a point opposite the anterior notopleural bristle.....*breviaculeus* n. sp.
Visible portion of ovipositor at least longer than segment 5; costal band extending distinctly below R_3; mesopleural stripe narrower, extending anteriorly to a point about opposite the front edge of the notopleural callus..... 15

15. Abdominal terga 3 to 5 with a median black vitta down the middle; ovipositor short (Fig. 20*a*), the extended ovipositor measuring only about 3.5 mm.....*mayi* n. name
No median vitta on the abdomen; ovipositor long and slender (Fig. 18*b*), about 5.5–6.0 mm. in length..... 16

16. Abdominal segments 3 to 5 chiefly black, rufous only in central portion; fifth tergum with a large brown to black spot on each side; the dark-colored vittae of the mesonotum narrow and the median portion of the dorsum broadly rufous
.....*kraussi* n. sp.
Segments 3 to 5 rufous except for a narrow basal band on the third tergum; no dark-colored spot on the fifth tergum; the black vittae of the mesonotum broad and separated by just a narrow reddish line down the middle of the dorsum (some specimens may run here)....*musae* (Tryon)

17. Abdomen with a black vitta extending longitudinally down the middle over terga 3 to 5; sides of abdomen rufous.....*pallidus* (Perkins and May)
Central portion of abdomen pale, no black vitta present; sides brownish to black..... 18

18. Abdomen predominantly black, third tergum all blackish; costal cells slightly yellowish; female ovipositor elongate, the visible portion is equal in length to the last two or three abdominal segments (Fig. 20*b*) (some specimens key here)....*kraussi* n. sp.
Abdomen chiefly rufous, third tergum brown to black only on the sides;

costal cells milky-white; ovipositor short and inconspicuous, the visible portion only about half as long as the fifth segment (Fig. 11*a*) . . . . . *barringtoniae* (Tryon)

19. Mesonotum with a median yellow postsutural vitta; costal band expanded at tip into a conspicuous apical spot . . . . . *cucurbitae* Coquillett

No median yellow vitta on mesonotum; costal band not expanded at apex 20

20. Only the r–m crossvein infuscated . . . . . *laticaudus* Hardy

With a complete crossband over the middle of the wing 21

21. An S-shaped band in the wing, extending over the r–m crossvein straight across the middle of cell 1st M_2 to the wing margin, back along the m crossvein, and out to the wing apex along vein M_{1+2} . . . . . *manskii* (Perkins and May)

Crossband extending over center of wing, not S-shaped or extending along M_{1+2} beyond m crossvein . . 22

22. Costal cells dark brown-fumose, very densely covered with microtrichia; notopleural calli yellow; r–m crossvein two times its own length from the m crossvein . . . . . *pulcher* (Tryon)

Costal cells hyaline, devoid of microtrichia except in apex of second cell; notopleural calli brown; r–m crossvein less than its own length from the m crossvein . . . . . *strigatus* (Perkins)

Dacus (Strumeta) barringtoniae (Tryon)

Fig. 11*a*, *b*

Strumeta barringtoniae Tryon 1927. Roy. Soc. Queensland, Proc. 38: 196–197.

This species is distinguished by its very short and broad ovipositor, its pale reddish to yellow thorax, and by the lack of a median vitta on the abdomen. It is most closely related to *D. breviaculeus* n. sp., but is easily separated by the characters noted above as well as by a comparison of the female ovipositors (Figs. 11*b* and 12*c*).

MALE. Predominantly pale species with brown to blackish markings only on the sides of the abdomen and sometimes on the pleura. *Head:* The frontal and the occipital bristles are dark brown to black, the other head bristles are brownish-red to yellow-red. There are two pairs of inferior fronto-orbital bristles. The front is nearly two times longer than wide and is but slightly discolored in the median part. The area around the bases of the frontal bristles is not discolored. The facial spots are large, almost circular, and extend to near the oral margin. The third antennal segment is brown to blackish on the inner dorsal surface. The third segment is about one and one-third times longer than the face (measured on a mid-line) and is nearly five times longer than wide. *Thorax:* Scutellum, humeri, etc., yellow, and with broad postsutural yellow vittae on the sides of the mesonotum. These vittae extend from the suture to just beyond the bases of the inner posterior supra-alar bristles. Except for the yellow markings the entire mesonotum is reddish in ground color. This ground color is partially obscured by dense gray pruinosity. This pruinosity is indistinctly divided by three subshining lines running longitudinally the full length of the thorax; one of these is median and the other two are submedian in position. The scutellum has a narrow brownish band at its base. The sternopleura and the anterior margins of the mesopleura are brown tinged. The yellow mark on the mesopleura is broad on the dorsal one-half to two-thirds of the sclerite and narrowed below. In the upper portion the spot covers three-fourths of the top margin of the sternopleuron. *Legs:* Entirely yellow except for the brownish discoloration on the hind tibiae. *Wings:* First two costal cells hyaline and devoid of microtrichia except in the apical portion of the second cell. Costal band and cubital streak distinct and brownish in color. The costal band is comparatively narrow but does extend a short way into cell R_3 and a short distance into cell R_5 at its apex. The cubital streak is broad and fills all of the

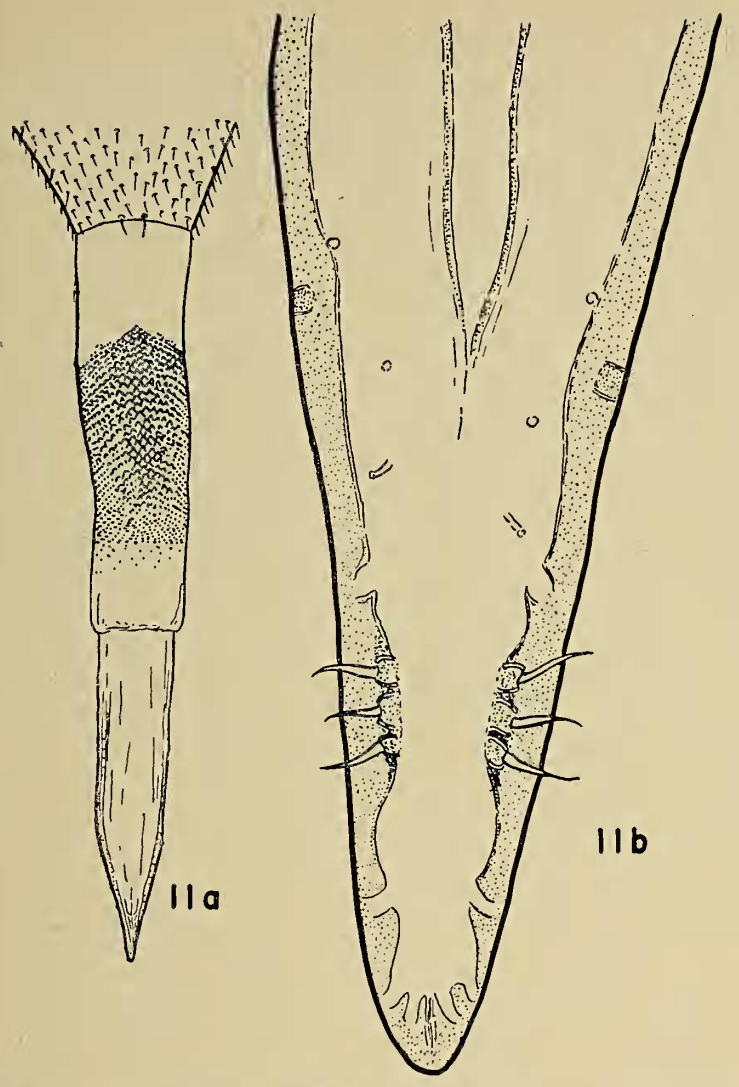


FIG. 11. *Dacus* (*Strumeta*) *barringtoniae* (Tryon): a, ovipositor, full length; b, apex of ovipositor.

basal part of cell M_4 extending almost to the top margin of the m–cu crossvein. The narrowed portion of the cubital cell is two times longer than the distance from the apex of the cell to the wing margin. *Abdomen:* Largely pale colored with no longitudinal vitta down the middle. The first tergum is brownish except for a narrow yellow band at its apex. The second tergum has a narrow yellow basal band followed by a brownish band and a broad pale yellow band which covers the apical half of the segment. Segments 3 and 4 are yellow in the middle and brown to blackish on the sides. The third tergum often has a complete but narrow brown to black basal band. The fifth tergum is entirely rufous except for brownish discolorations on the anterior lateral margins.

Length: Body, 7.8 mm.; wings, 6.8 mm.

FEMALE. The cubital streak extends slightly more than half way between the apex of cell Cu and the wing margin. The narrowed portion of cell Cu is only about one and one-fourth times longer than the distance from the apex of the cell to the wing margin. *Ovipositor:* Very short and inconspicuous. In pinned specimens the visible portion of the ovipositor is just slightly over one-half as long as the fifth abdominal segment. The extended ovipositor is short and stubby and comparatively broad (Fig. 11*a*). The ovipositor measures about 3.3 mm. The piercer (Fig. 11*b*) is approximately 1.0 mm. long by about 0.23 mm. wide and is sharply tapered from a point well before the apex of the oviduct. The apex of the oviduct is about 0.21 mm. from the tip of the piercer. The preapical setae are inconspicuous and all are approximately equal in size. The apical pair is located about 0.045 mm. from the tip of the piercer. This distance is just slightly greater than the length of the plate bearing the setae. The inversion membrane is approximately 1.22 mm. long by 0.34 mm. wide. The scales are large, conspicuous, and sharp-pointed. The rasper extends to within 0.28 mm. of the base of segment 8. The basal segment of the ovipositor is about 1.2 mm. long by 1.0 mm. at its widest point.

Length: Approximately the same as in the male.

TYPE LOCALITY: Cairns, Queensland, ex *Barringtonia calyptrata*.

Type in the Queensland Museum.

Forty-five specimens are in the Krauss collection from Cairns, Queensland, ex *Barringtonia calyptrata*, Dec., 1949–Jan., 1950.

Dacus (Strumeta) breviaculeus n. sp.

Fig. 12*a–c*

This species is closely related to *D. barringtoniae* (Tryon) because of the very short inconspicuous ovipositor of the female and the predominantly pale body. It is distinguished by differences in the female ovipositors, as illustrated in Figures 11*b* and 12*c*; by the presence of two distinct brownish to black vittae on the mesonotum; by the smaller size; and by the presence of an in-

distinct to distinct median brown to black vitta on abdominal terga 3 and 4.

The species also appears to be related to *D. mayi* new name. It is readily separated from *D. mayi* and other related species by the marked differences in the female ovipositors (Figs. 12*c* and 20*a*), by the narrow costal band, by the lack of a median dark-colored vitta down the mesonotum, by the lack of the brown shining spots and median vitta on the fifth tergum, and by the predominantly pale coloration of the abdomen.

MALE. *Head:* Entirely yellow to reddish except for the shining black facial spots and for a slightly brownish discoloration in the middle of the front and sometimes at the bases of the frontal bristles. The front is two times longer than wide. The frontal spots are large, oblong, and slightly pointed below. All of the head bristles are dark brown to black. There are two pairs of inferior fronto-orbital bristles. The third antennal segment is brownish to black tinged on the upper surface, it is distinctly longer than the face (measured on a mid-line), and is three and one-half times longer than wide. *Thorax:* Chiefly yellowish to reddish with some dark brown to black markings on the pleura and mesonotum. With yellow, yellowish-white, or cream-colored humeri, scutellum, post-sutural lateral stripes, and other areas typical of most members of this group. The base of the scutellum does not have a conspicuous brown to black band. The lateral yellow vittae extend from the suture to the postalar bristles. Between the lateral vittae are a pair of submedian brown to black stripes extending longitudinally, between the pre-scutellar and the postalar bristles, from the scutellum to the anterior margin of the thorax between the inner and outer scapular bristles (Fig. 12*a*). The stripes are expanded on the posterior portion in front of the scutellum, are briefly interrupted at the suture, and are expanded laterally in back of the humeri. The median portion of the mesonotum, between the black stripes, is clear yellow in

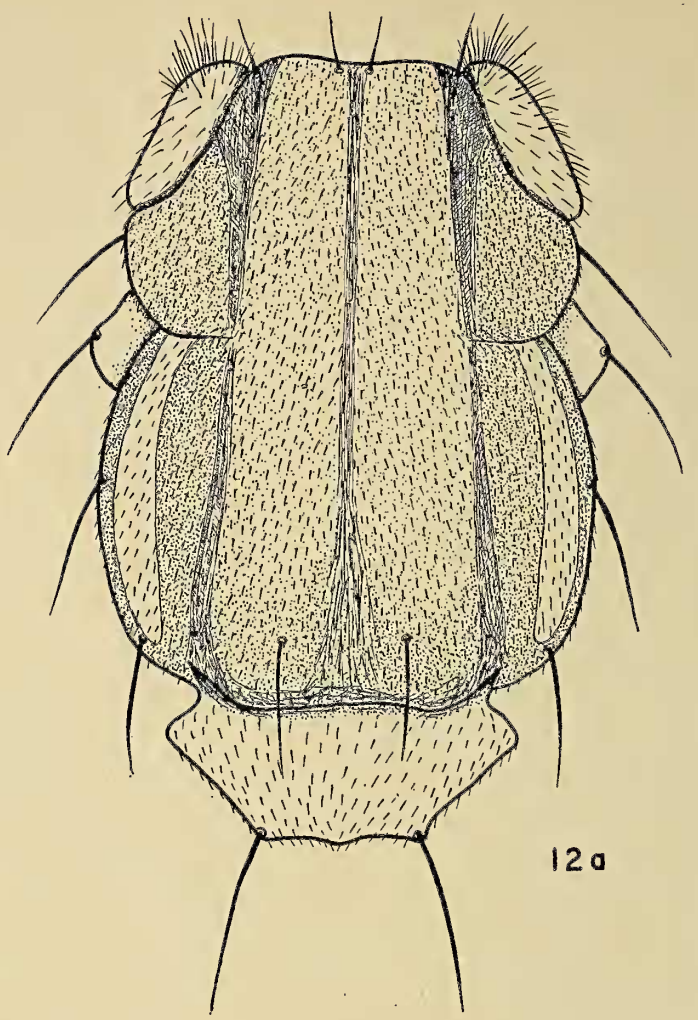


FIG. 12. *Dacus* (*Strumeta*) *breviaculeus* n. sp.: a, thorax, dorsal view; b, ovipositor, full length; c, apex of ovipositor.

ground color (well differentiated from the cream markings of the thorax), and is covered with gray pruinosity except for a shining vitta down the middle extending the full length of the thorax. The bristles are reddish-brown to black. The halteres are pale yellow. *Legs:* Chiefly yellow. The hind tibiae are tinged with brown to black. *Wings:* Chiefly hyaline, with a distinct but narrow costal band and a broad cubital streak. The first two costal cells are hyaline to very faintly yellowish and are devoid of microtrichia except in the apical part of the second costal cell. The costal band does not extend noticeably below vein R_3 except in the apical part of cell R_3. The band extends a short distance into cell R_5 at its apex. The r–m crossvein is straight, without a noticeable curve. The cubital streak fills all of the basal part of cell M_4 nearly to the top margin of the m–cu crossvein. The narrowed portion of the cubital cell is two times longer than the distance from the apex of the cell to the wing margin. *Abdomen:* Predominantly yellow with dark brown to black on the sides. The first tergum is largely brown with a narrow yellow-red apex. The second tergum has a narrow yellow-red band across the base, followed by a brown to black band, and by a broad yellowish band which occupies the apical half. The third tergum has a black band across the base and the sides are broadly black. The median portion has a very faint, brownish vitta extending over it. In some specimens this is very distinct and extends over segment 4. The fourth tergum is broadly yellow in the central portion (except as noted above) and blackish on the sides. The fifth tergum is largely yellow except for narrow brownish lateral margins.

Length: Body, 6.0 mm.; wings, 5.2 mm.

FEMALE. The cubital streak fades out about halfway along vein Cu_1 and 1st A. The narrowed portion of the cubital cell is one and one-third times longer than the distance from the apex of the cell to the wing margin. *Ovipositor:* Extremely short, scarcely noticeable in *in situ* specimens. From a dorsal view the visible part of the ovipositor is usually less than half as long as the fifth abdominal segment. When the ovipositor is fully extended (Fig. 12*b*) it measures approximately 2.5 mm. in length. The piercer is about 0.75 mm. long by 0.12 mm. wide. Four pairs of setae are conspicuous (Fig. 12*c*), the two distad pairs are about twice as well developed as the basal pair. The setae are situated about 0.055 mm. from the apex of the piercer, measured from the bases of the apical pair. This is slightly more than three times the length of the plate bearing the setae and four times longer than the longest setae. The piercer is just slightly more than six times longer than its greatest width and is gradually tapered beyond the apex of the oviduct (Fig. 12*c*). The oviduct extends to within 0.13 mm. from the tip of the piercer. The inversion membrane is about 0.83 mm. long by 0.2 mm. wide. The scales of the rasper are large, conspicuous, diamond-shaped, and extend to within 0.2 mm. of the base of the eighth segment. The basal segment is about 0.9 mm. long, measured on a mid-line, by 0.75 mm., measured across its hind margin. The spiracles are 0.13 mm. from the base of the segment, measured on the lateral margins.

Length: Approximately the same as in the male.

Holotype male, allotype female, and 12 paratypes (6 males and 6 females): near Atherton, Queensland, Dec., 1949, ex *Glochidion harveyanum*. Two male paratypes: Cairns, Queensland, Aug., 1949, same host as type.

Type, allotype, and two paratypes deposited in the United States National Museum. Three paratypes are in the Bishop Museum collection, Honolulu, T. H.; three are in the Board of Agriculture and Forestry collection, Honolulu, T. H.; three are at the Hawaiian Sugar Planters' Association; and three are in the University of Hawaii collection.

Three specimens, one female and two males, which apparently belong here, were

in the collection from Cairns, ex guava, Apr., 1950. The ovipositor is just slightly longer but is structurally the same.

Dacus (Strumeta) bryoniae (Tryon)

Fig. 13*a*, *b*

Chaetodacus bryoniae Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 192.

This species is easily separated from other Australian species of *Dacus* by the broad costal band, the yellow costal cells nearly devoid of microtrichia, and the characteristic development of the female ovipositor.

MALE. Comparatively large, chiefly black-bodied species. *Head:* All rufous except for the shining black facial spots and the ocellar triangle. The median portion of the front and the bases of the frontal bristles are just slightly discolored with brownish. The front is parallel sided and is one and one-half times longer than wide. There are two pairs of inferior fronto-orbital bristles. The facial spots are circular to oval and are equal in length to about one-fourth the length of the face. The antennae are reddish, tinged with brownish on the third segment. The second segment is nearly two times longer than the first and is nearly half as long as the third. The third segment is about four times longer than broad. All of the head bristles are dark brown to black. *Thorax:* Dorsum all black except for the usual yellow markings which include two rather broad postsutural vittae. The median portion of the mesonotum is grayish pubescent, indistinctly divided into four parts by three narrow subshining longitudinal lines. The lateral yellow vittae extend from the suture to the inner supra-alar bristles. The base of the scutellum has a narrow black band. The metanotum is black, sometimes reddish in the central portion. The yellow vertical stripe on the mesopleura is broad and nearly parallel sided. *Legs:* All yellowish, except for brownish coxae, hind tibiae, and apical subsegments of tarsi. *Wings:* First two cells of the costa distinctly yellow-fumose but devoid of microtrichia except in the apical portion of the second cell. The costal band fills all of cell R_3 and extends a short distance below vein R_{4+5} along its entire length. At the apex of the wing the band extends broadly below R_{4+5} about one-third the distance to vein M_{1+2}. The cubital streak is broad; it fills all of the basal section of cell M_4 and extends nearly to the top margin of the m–cu cross-vein. The narrowed portion of the cubital cell is about three times longer than the section from the apex of the cell to the wing margin. *Abdomen:* Chiefly reddish with a broad basal band on the third tergum, a subbasal black band on tergum 2, and a narrow black line running longitudinally down the middle of terga 3 to 5; this sometimes extends but a short distance onto the fifth tergum. The first tergum is discolored with brown to black, at least on the basal portion.

Length: Body, 7.8–8.0 mm.; wings, 7.0–7.2 mm.

FEMALE. The narrowed portion of the cubital cell is about one and one-fourth times longer than the distance from the apex of the cell to the wing margin. *Ovipositor:* Short and inconspicuous; in pinned specimens the visible portion of the ovipositor is shorter than the fifth abdominal segment. The extended ovipositor (Fig. 13*a*) is about 5.3 mm. in length and is very broad compared to its length. The piercer and the inversion membrane both measure about 1.9 mm. in length. The piercer is broadest just behind the tip of the oviduct and at this point measures about 0.3 mm. in width. The apex of the oviduct is approximately 0.45 mm. from the tip of the piercer, and the piercer tapers gradually from this point to a blunt tip. The setae are very tiny, inconspicuous (Fig. 13*b*), and difficult to see. There appear to be three setae on each side located about 0.22 mm. from the apex of the piercer. The inversion membrane is 0.6 mm. wide at its broadest point. The scales of the rasper are small, very numerous, and blunt at apices; they extend all the distance to the apex and to within

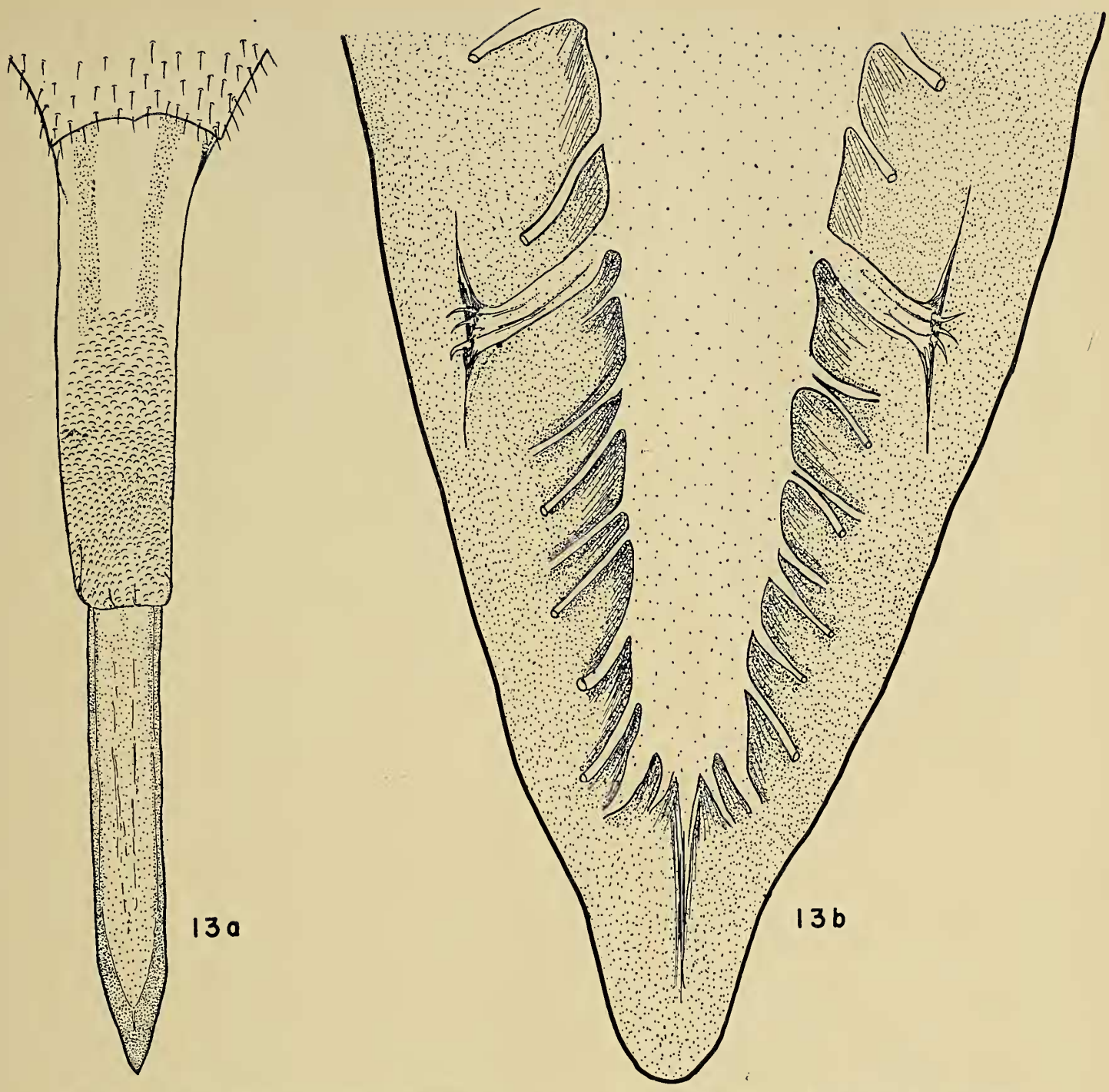


FIG. 13. *Dacus* (*Strumeta*) *bryoniae* (Tryon): a, ovipositor, full length; b, apex of ovipositor.

about 0.65 mm. of the base of the eighth segment.

TYPE LOCALITY: Blackall Range, Brisbane District. Reared from *Bryonia lacinosa*.

Type in the Queensland Museum.

Six specimens are in the collection reared from the above host, from near Deeral, Queensland, June, 1949. Tryon says it is also associated with *Melothria cunninghamii*.

Dacus (Strumeta) cacuminatus (Hering)

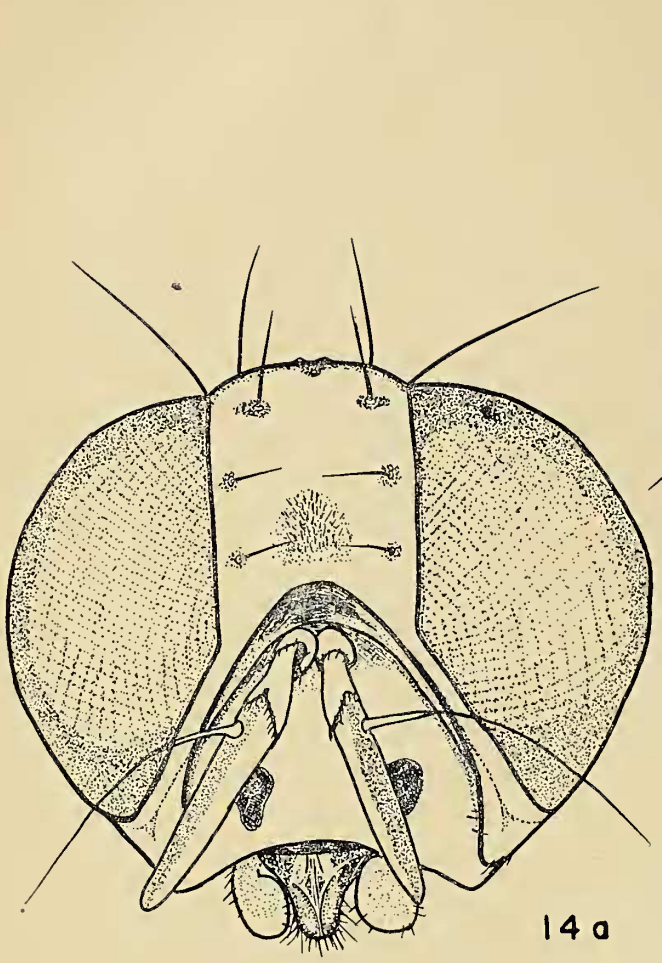
Fig. 14*a–e*

Strumeta cacuminata Hering 1941. Mus. Nat. Hung., Ann. 34: 46–47.

Chaetodacus dorsalis Tryon, nec. Hendel, 1927. Roy. Soc. Queensland, Proc. 38(14): 194–196.

Strumeta solani Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 14–16.

This species has been treated many times in the Australian literature and much confusion has been centered around its nomenclature. It has commonly been known as the "Solanum fly" because of its apparent host specificity for two species of *Solanum*. It has appeared in the literature under the specific names *dorsalis*, *ferrugineus*, *tryoni*, and *solani*. The name *solani* was used by several of the earlier workers (Jarvis, 1922 and 1926*b*; Froggatt, 1924; Perkins and Hardy, 1925) in



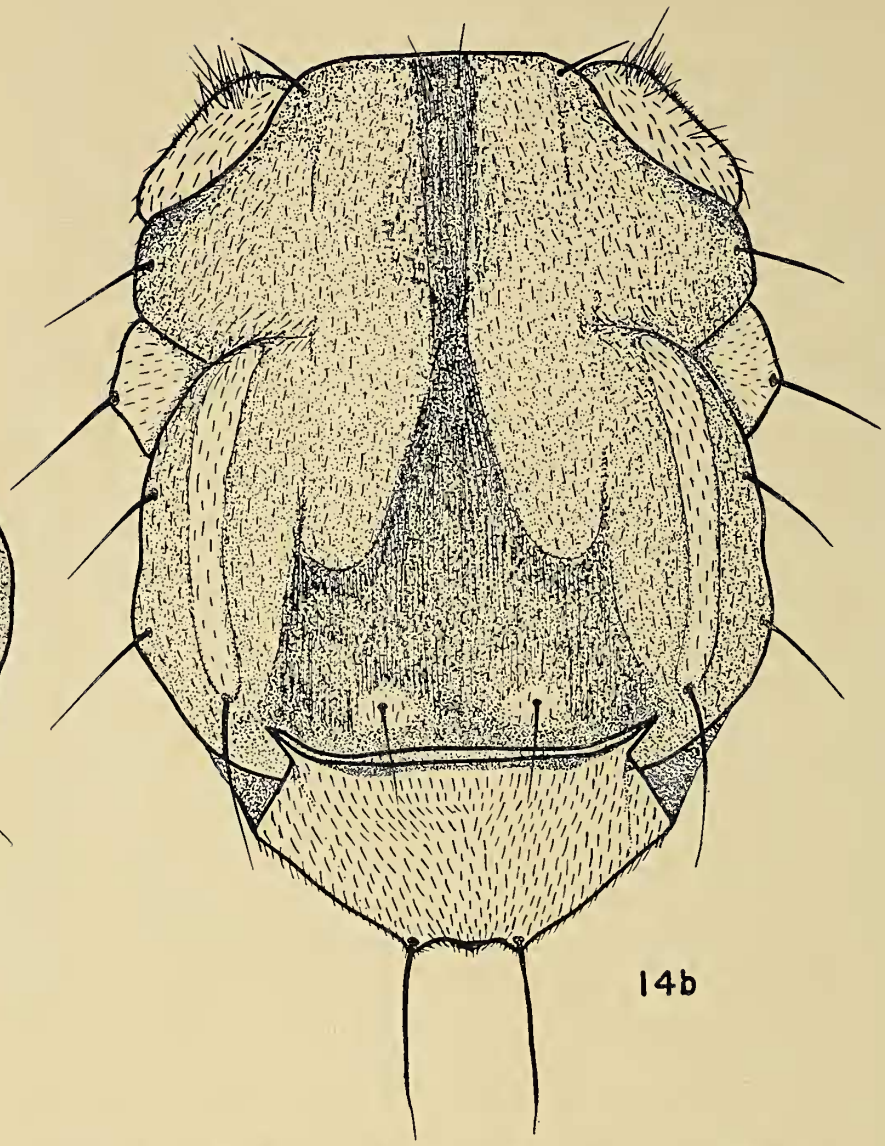
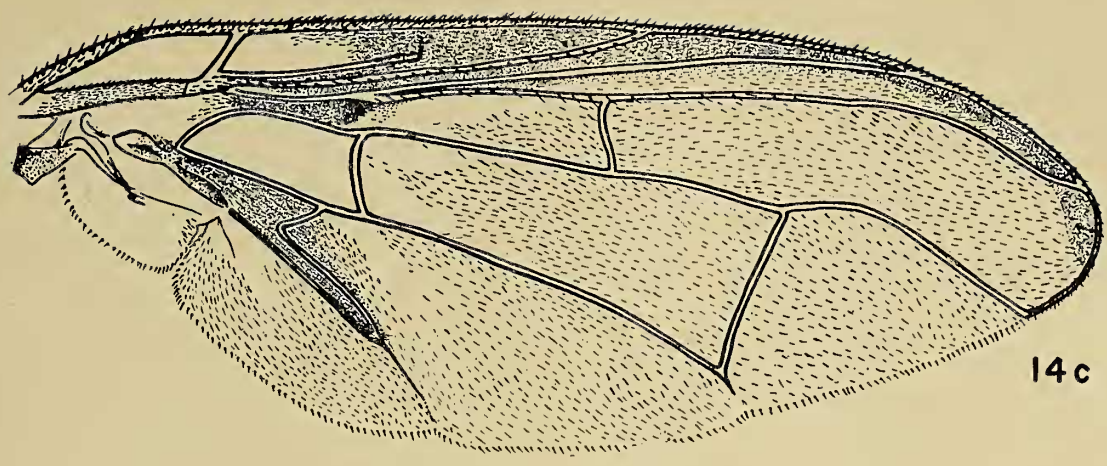
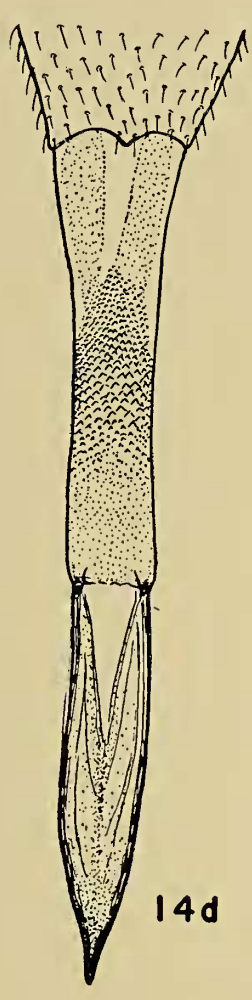


FIG. 14A. *Dacus* (*Strumeta*) *cacuminatus* (Hering): a, head of male, front view; b, thorax, dorsal.

a varietal sense under the names *Dacus tryoni* and *Dacus ferrugineus*. Tryon (1927) cited the name "*O. solani* Tryon mss.=*C. dorsalis* Hend." (The "O" was no doubt a typographical error.) The name *solani* was a manuscript name of Tryon's but was a *nomen nudum* until Perkins and May (1949) described as new the "Australian *dorsalis*" under the name *Strumeta solani*.

D. cacuminatus was confused with *D. dorsalis* Hendel in much of the more recent literature, and evidently Hering's description (1941*a*) was overlooked by the Australian workers. The species is related to *D. dorsalis* but is readily separated by a number of characteristics. The black mesonotal pattern is consistently different. It is represented by a rather narrow median line extending the full length of the thorax. This median line gradually widens behind the suture and expands broadly over the posterior portion of the mesonotum (Fig. 14*b*). The area around, and posterior to, the prescutellar bristles is often reddish, and the basal portion of the black pattern is sometimes almost Y-shaped. A pair of thin brown to blackish vittae is usually present, extending cephalad from the lateral edges of the black pattern and ending before the suture or extending as two faint lines to the inner edges of the humeri. The black median line is apparently a constant character. It has been present on all of the several thousand specimens which I have examined. In the color variations of the true *dorsalis* the mesonotal pattern apparently never breaks down into a median vitta with an expanded base. In *D. cacuminatus* the yellow vittae on the mesonotum end at the inner supra-alar bristle and at the suture. They do not extend beyond the bristles and into or along the suture as they do in *D. dorsalis*. The vittae are broadest on their an-





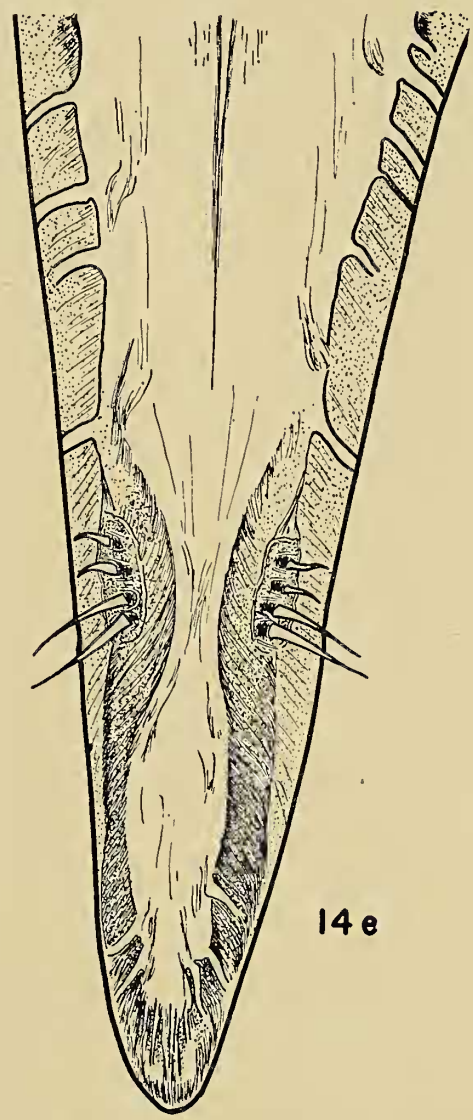


FIG. 14B. *Dacus* (*Strumeta*) *cacuminatus* (Hering): c, wing of female; d, ovipositor, full length; e, apex of ovipositor.

terior portions and narrowed posteriorly—not broad at both ends and parallel sided as in *dorsalis*. The prescutellar bristles are more widely spaced in *cacuminatus*; the distance between the bristles is equal to slightly greater than the distance between the scutellars. In *dorsalis* the prescutellars are slightly closer together than the scutellars. The wings are very similar to *dorsalis*, differing chiefly in having a broader, more distinct cubital streak. The streak fills almost all of the basal portion of cell M_4, approximately to the hind margin of the m–cu crossvein (Fig. 14*c*). In *dorsalis* the streak fills only about the basal half of cell M_4. The basal section of the anal veins (possibly including the base of cubitus) is hyaline to faintly yellowish translucent in *cacuminatus*. In *dorsalis* this basal portion is opaque whitish to yellow. The color pattern of the abdomen differs somewhat from typical *dorsalis*, although the most constant difference appears to be the lack of a

complete black band on the basal portion of the second tergum in *cacuminatus*. The female ovipositors provide excellent characters for separating these species. The ovipositor of *cacuminatus* is shorter and thicker, the rasper extends nearer to the base of segment 8, the apex of the oviduct and the setae on the piercer are farther from the apex of that segment, and the plate or section bearing the setae is very short compared to that of *dorsalis*. Following are the specific characteristics of the ovipositor of *cacuminatus*. In undissected specimens the visible portion of the ovipositor is about equal in length to the fifth tergum. When the ovipositor is fully extended (Fig. 14*d*), it measures about 3.7 mm. in length. The piercer is about 1.2 mm. by about 0.25 mm. at its widest point. The apex of the oviduct is about 0.2 mm. from the apex of the piercer. The setae are inconspicuous and are situated about 0.07 mm. from the apex of the segment. This distance is equal to four times the length of the plate bearing the setae or the length of the longest setae (Fig. 14*e*). The inversion membrane is about 1.3 mm. long by 0.3 mm. at its broadest point. The scales of the rasper extend to within 0.32 mm. of the base of the segment. The basal segment is about 1.2 mm. long, and the spiracles are 0.33 mm. from the posterior lateral margins of segment 7.

Length: Body, 6.0–7.0 mm.; wings, 5.5–6.4 mm.

TYPE LOCALITY: Brisbane.

Type in the Musei Nationalis Hungarici, Budapest.

This species has been recorded from numerous localities in Australia. It is chiefly associated with the two common species of wild tobacco, *Solanum verbascifolium* Ait. and *S. auriculatum* Ait.

A large number of specimens are in the collection from Atherton Tableland, Queensland, June to Nov., 1949, ex the fruits of these two species of *Solanum*. One specimen is at hand, ex *Rhipogonum papuanum* near Atherton, Queensland, Nov., 1949. This is the first record of this species infesting fruits other than those of solanaceous plants. It is possible that the record is an error.

Dacus (Strumeta) endiandrae
(Perkins and May)

Fig. 15*a*, *b*

Strumeta endiandrae Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 9–10.

This species is related to *D. musae* (Tryon) and is separated by the presence of a longitudinal black vitta down the middle of the abdomen and by the differences in the female ovipositors as illustrated in Figures 15*a* and 21*b* and as given under the discussions of the ovipositors. *D. endiandrae* is very similar to *D. dorsalis* Hendel and should be considered in this complex of species. In general characteristics and coloration it is much like *D. dorsalis* and is evidently the nearest thing to this species that occurs in Australia. *D. endiandrae* is distinguishable from *dorsalis* by the broad cubital streak and more elongate cubital cell in the wing. Comparison of the female ovipositors shows close relationship, but specific differences are evident. The piercer is shorter in *endiandrae*, the setae are farther from the apex of the ovipositor, and the scales of the rasper extend nearer to the base of segment 8 than they do in *dorsalis*.

Except for the female ovipositor, the species has been adequately described by Perkins and May, and the following are the diagnostic characteristics of both sexes. *Head:* The front is nearly two times longer than wide and has two pairs of inferior fronto-orbital bristles. The facial spots are oval and somewhat pointed on the lower margin. *Thorax:* Predominantly black, especially on the dorsum. Mesonotum often with a reddish spot between the prescutellar bristles; in some specimens this extends part way down the dorsum as a narrow median vitta. The scutellum has a narrow black band at its base. The prescutellar bristles are the same distance apart as the

scutellars. *Wings:* The two costal cells are hyaline and devoid of microtrichia except in the apical portion of the second section. The costal band is comparatively narrow but does extend faintly along the underside of vein R_3. The costal band extends a short distance beyond the apex of vein R_{4+5}, about one-third the distance across the apex of cell R_5. The cubital streak is moderately broad and fills the basal portion of cell M_4 up to the lower margin of the m–cu crossvein. In the male the narrowed portion of cell Cu is two times longer than the distance from its apex to the wing margin. In the female the narrowed portion of Cu is one and one-third times longer than the distance to the wing margin. *Abdomen:* Colored as in *dorsalis* with the first tergum chiefly dark colored, the second yellow-white on the apical half and with a subbasal brown to black crossband; a black longitudinal median vitta extends down terga 3 to 5 and a broad basal band of black is on the third tergum. *Ovipositor:* Comparatively short, rather inconspicuous in pinned specimens. The extruded portion of the ovipositor is usually about equal in length to the fifth tergum. The extended ovipositor (Fig. 15*a*) is about 3.6 mm. in length. The piercer measures approximately 1.2 mm. long by 0.19 mm. wide at its broadest point. The setae are well developed and are located about 0.065 mm. from the apex of the piercer. This distance is equal to four times the length of the plate bearing the setae or to the length of the longest setae (Fig. 15*b*). The piercer tapers gradually from a point in front of the apex of the oviduct. This apex is about 0.22 mm. from the tip of the piercer. The inversion membrane is 1.4 mm. long by 0.22 mm. at its widest point. The scales of the rasper extend to within 0.45 mm. of the base of the eighth segment. The basal segment is about 1.2 mm. long on a mid-line by 1.0 mm. across its hind margin. The spiracles are located about 1.9 mm. from the base of the seventh segment measured on the lateral margins.

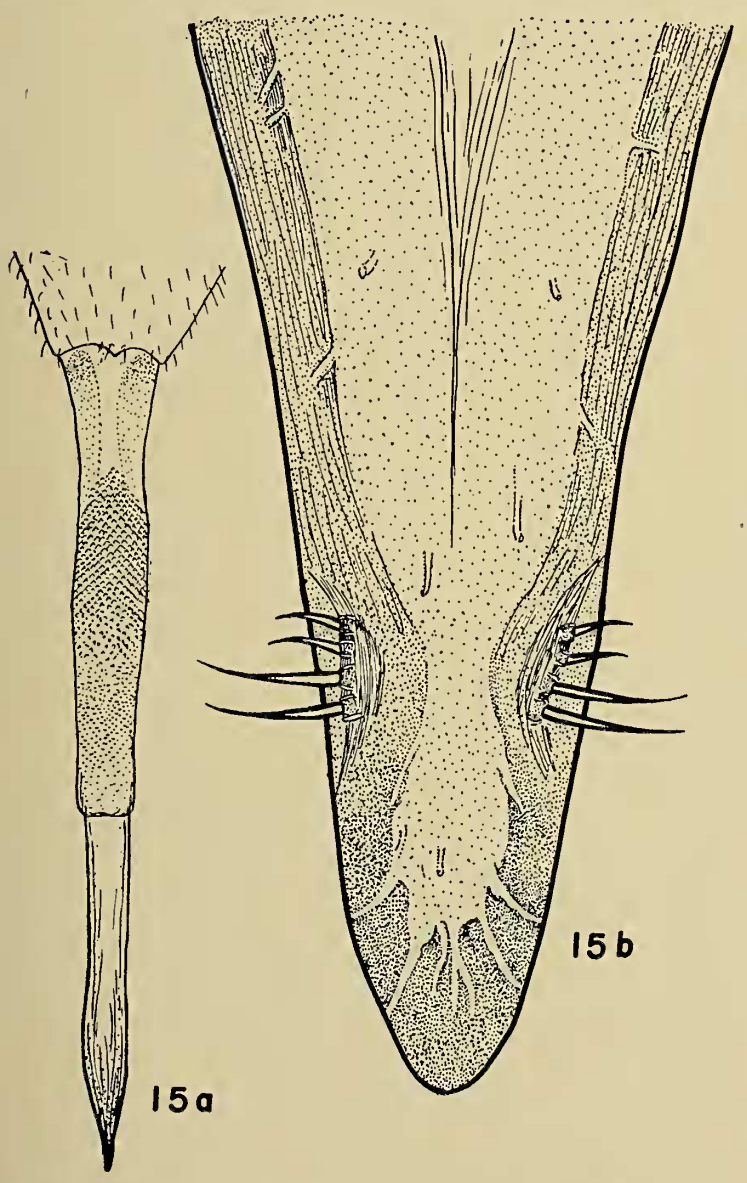


FIG. 15. *Dacus* (*Strumeta*) *endiandrae* (Perkins and May): a, female ovipositor, full length; b, apex of ovipositor.

Length: Body, 5.8–6.5 mm.; wings, 5.1–5.9 mm.

TYPE: No type or type locality designated. Described from a series bred from *Endiandra discolor* and *Cryptocarya erythroxylon* at Cairns and Mossman, Queensland.

Location of cotypes: University of Queensland.

A large series of specimens is in the Krauss collection from the following localities and hosts: near Deeral, Queensland, ex *Endiandra tooram*, July, 1949; Atherton Tableland, Queensland, ex same host, Nov., 1949; Cairns, Queensland, ex "Oval, dark purple fruit, ¾″ long," Nov., 1949; Babinda, Queensland, ex "dark purple fruit, 1″ long–⅝″ diameter," Nov., 1949; Atherton Tableland, ex *Beilschmiedia obtusifolia*, Nov., 1949; and Atherton Tableland, ex *Litsea leefeana*, Nov., 1949. Two specimens were also mixed

in with a large series of *Dacus kraussi* n. sp. from Deeral, ex *Acmena macrocarpa*, June, 1949. These may have been included in this series by accident.

Dacus (Strumeta) fagraeus (Tryon)

Fig. 16*a*, *b*

Chaetodacus fagraea Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 188–190.

This species is very characteristic and is easily recognized by its pale color, its very elongate female ovipositor, and by the pointed facial spots.

MALE. *Head:* The front is about two times longer than wide, with distinct brownish spots at the bases of the frontal bristles and brownish on the tumescence. Two pairs of inferior fronto-orbital bristles are present. The facial spots are large and conspicuous and have the underside drawn out into a sharp point which extends almost to the oral margin. The third antennal segment is brownish and is slightly longer than the face and about four times longer than wide. *Thorax:* Reddish except for the usual yellow markings; no dark marks. *Legs:* Entirely reddish to yellow, hind tibiae sometimes brownish tinged. *Wings:* The first two costal cells are hyaline to very faintly yellowish, devoid of microtrichia except in the apical portion of the second cell and the top margin of the first cell. The costal band is moderately developed. It extends faintly along the underside of vein R_3 and ends in the wing apex just beyond R_{4+5}. The cubital streak is broad and fills all of the basal part of cell M_4, extending nearly to the top edge of the m–cu crossvein. The narrowed portion of the cubital cell is about three times longer than the portion from the apex of the cell to the wing margin. *Abdomen:* Entirely rufous with no distinct brown to black markings.

Length: Body, 6.5–7.0 mm.; wings, 6.0–6.5 mm.

FEMALE. The fifth tergum sometimes has a faint brownish median vitta. The narrowed portion of the cubital cell is nearly two times

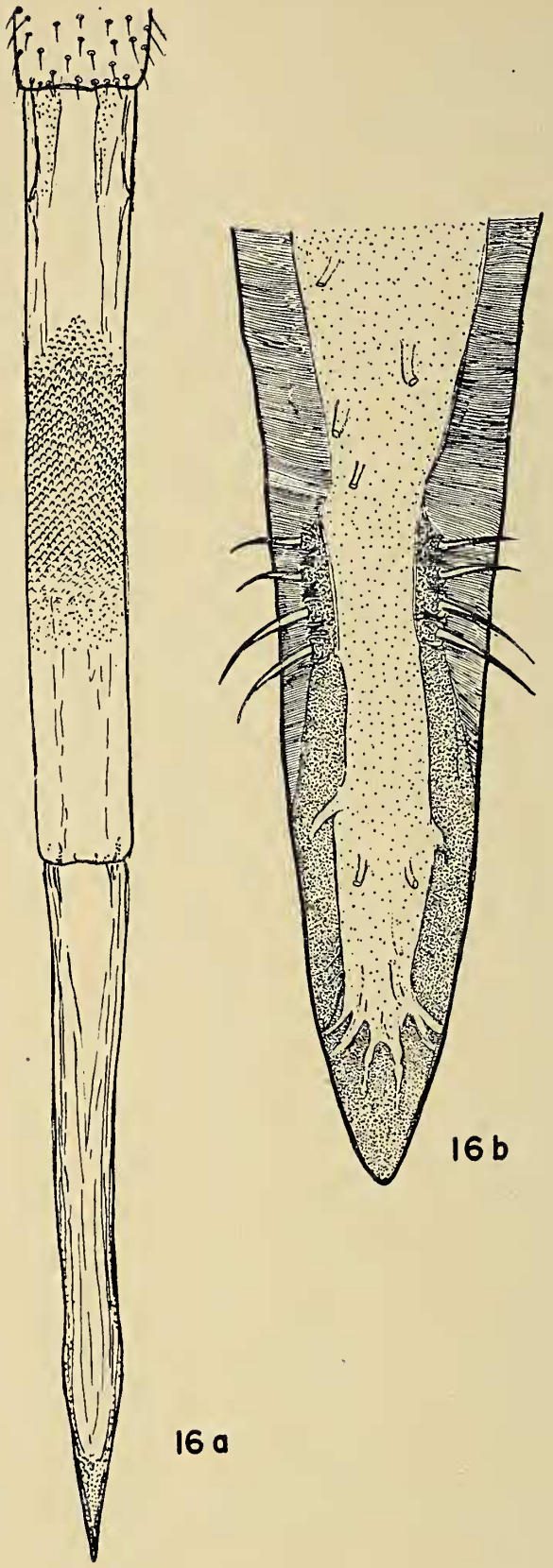


FIG. 16. *Dacus* (*Strumeta*) *fagraeus* (Tryon): a, ovipositor, full length; b, apex of ovipositor.

longer than the distance from the apex of the cell to the wing margin. *Ovipositor:* Always conspicuous; because of its unusual length it cannot be drawn in out of sight. The extended portion in specimens *in situ* is equal to or greater than the combined lengths of abdominal segments 3 to 5. The extended ovipositor (Fig. 16*a*) is equal to or longer than the remainder of the body; it is approximately

7.0 mm. long. The piercer (Fig. 16*b*) is about 2.4 mm. long by 0.19 mm. wide. The end of the oviduct is about 0.23 mm. from the apex of the piercer, and the setae are situated about 0.09 mm. from the apex. The inversion membrane is approximately 2.6 mm. long by 0.34 mm. wide. The scales of the rasper are pointed and extend to about 0.85 mm. from the base of the eighth segment. The basal segment of the ovipositor is elongate and is noticeably constricted on its apical two-fifths. The basal segment is about 2.1 mm. long by 1.35 mm. at its widest point. The spiracles are located about 0.38 mm. from the base of the segment.

TYPE LOCALITY: Babinda, N. E. Queensland, ex *Fagraea mulleri* Benth.

Type in the Queensland Museum.

Approximately 150 specimens are in the Krauss collection from near Deeral, Queensland, ex *Fagraea cambogeana*, Sept., 1949. Four specimens are from Babinda, Queensland, ex *Eugenia* sp. near *suborbiculata*, Sept., 1949.

Dacus (Strumeta) halfordiae (Tryon)

Fig. 17*a*, *b*

Chaetodacus halfordiae Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 190–191.

Chaetodacus gurneyi Perkins 1934. Roy. Soc. Queensland, Proc. 45: 41–42. New synonymy.

This synonymy is based upon a close comparison of the original descriptions and upon a study of specimens from the type locality of *D. gurneyi* as well as from other localities in Queensland. The synonymy has been confirmed by Mr. Alan May.

This species is distinguished from other known Australian species of *Dacus* by the largely brownish disc of the scutellum, by the black spots on the fifth tergum, and by the characters of the female ovipositor. The general body coloring is similar to that of *D. tryoni* (Froggatt) and the costal cells are usually yellowish-fumose but are bare of microtrichia except in the apical portion of the second cell. The specimens at hand are not in good condition; one series is teneral and the others were preserved in alcohol and are badly discolored. Only the most important characteristics are given below.

MALE. Chiefly pale colored, yellow-brown to rufous. *Head:* Front about one and three-fourths times longer than wide, with two pairs of inferior fronto-orbital bristles. The facial spots vary somewhat in size and shape from oval to a narrow black streak; the spots are usually pointed on the lower margin. The third antennal segment is just slightly longer than the face and little more than three times longer than wide. *Thorax:* Varying from chiefly yellowish to rufous to yellow-brown. A brown to black vitta is usually present on each side, extending from just inside the inner posterior supra-alar to the margin of the

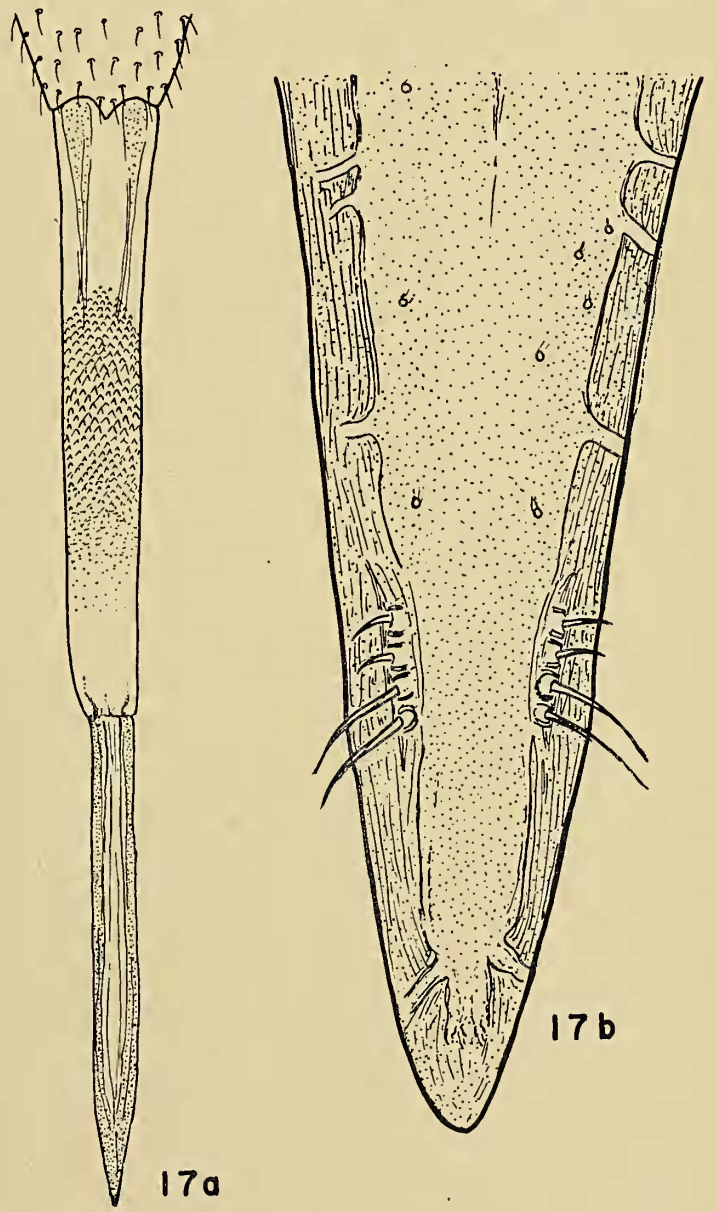


FIG. 17. *Dacus* (*Strumeta*) *halfordiae* (Tryon): a, ovipositor, full length; b, apex of ovipositor.

humerus; usually interrupted at the suture. The disc portion of the scutellum is brown, the margins are yellow. In teneral specimens the entire scutellum may be yellow. *Wings:* First two costal cells faintly yellow to almost hyaline, devoid of microtrichia except in the apical part of the second cell and sometimes along the extreme top margin of the first cell. The costal band is conspicuous but is not noticeably extended below vein R_3 except at its apex. The cubital streak is broad and fills all of the basal portion of cell M_4. The narrowed portion of the cubital cell is about two times longer than the free portion of vein Cu_1+1st A. *Abdomen:* Varying from yellow-brown to almost all yellowish, probably depending upon tenerality. The large brown to black lateral spots on the fifth tergum are very conspicuous.

Length: Body, 5.5–7.0 mm.; wings, 5.0–6.0 mm.

FEMALE. The narrowed portion of the cubital cell is about one and one-third longer than Cu_1+1st A. *Ovipositor:* Conspicuous and well developed; the exposed portion is about equal in length to segments 3 to 5 of the abdomen. The extended ovipositor (Fig. 17*a*) is approximately 5.0 mm. long. The piercer is about 1.56 mm. long by 0.15 mm. wide. The end of the oviduct is about 0.19 mm. from the apex of the piercer. The setae are situated about 0.02 mm. from the apex or about two times the length of the plate bearing the setae or the length of the longest pair. The apex of the piercer is rather blunt when viewed under high magnification (Fig. 17*b*). The inversion membrane is about 2.0 mm. long by 0.2 mm. wide, measured at its base. The scales are thorn-like and extend to within about 0.6 mm. from the base of the segment. The base of the ovipositor is about 1.46 mm. long by 1.0 mm. across its hind margin.

TYPE LOCALITY: Southport, South Queensland.

Type in the Queensland Museum.

Specimens were sent in by Mr. Krauss from Narara, New South Wales, Nov. 29, 1933, ex *Eugenia* sp. (coll. by C. P. Hely).

Dacus (Strumeta) kraussi n. sp.

Fig. 18*a–c*

This species occupies a borderline position between the group of species in which the first two sections of the costa are yellow-fumose and those species in which these cells are hyaline. *D. kraussi* is related to *D. tryoni* (Froggatt) and has probably been confused with that species. The most striking differences in the two species are in the female ovipositors. In *D. kraussi* the ovipositor is nearly two times longer than that of *D. tryoni*; moreover, it is much more slender and differs in several structural details. The first and second costal cells are subhyaline to lightly yellowish and are devoid of microtrichia except along the top margin of the first cell and the apical half of the second. In *D. tryoni* the costal cells are bright yellow-fumose and are densely covered with microtrichia throughout the second cell and the apical half and top margin of the first. In *D. kraussi*, cell R_5 (the apical cell) is expanded at its apex. Veins R_{4+5} and M_{1+2} are slightly divergent at their apices so that the cell is broader at the apex than at any other point; its width is equal to the length of the m crossvein. In *D. tryoni* the apical cell is not expanded at the apex; it is as broad at a point opposite the m crossvein as it is at the wing margin, and the width at the apex of the cell is less than the length of the m crossvein.

This species is also related to *D. barringtoniae* (Tryon). In the preliminary studies of this collection some of the specimens under this series were classified as "*barringtoniae?*" The species are easily separated by the comparatively elongate ovipositor of *D. kraussi* and the very short stubby ovipositor of *D. barringtoniae*, by the yellowish costal cells in *D. kraussi* and the milky white cells in *D. barringtoniae*, and by the predominantly black abdomen of *D. kraussi* with the third tergum

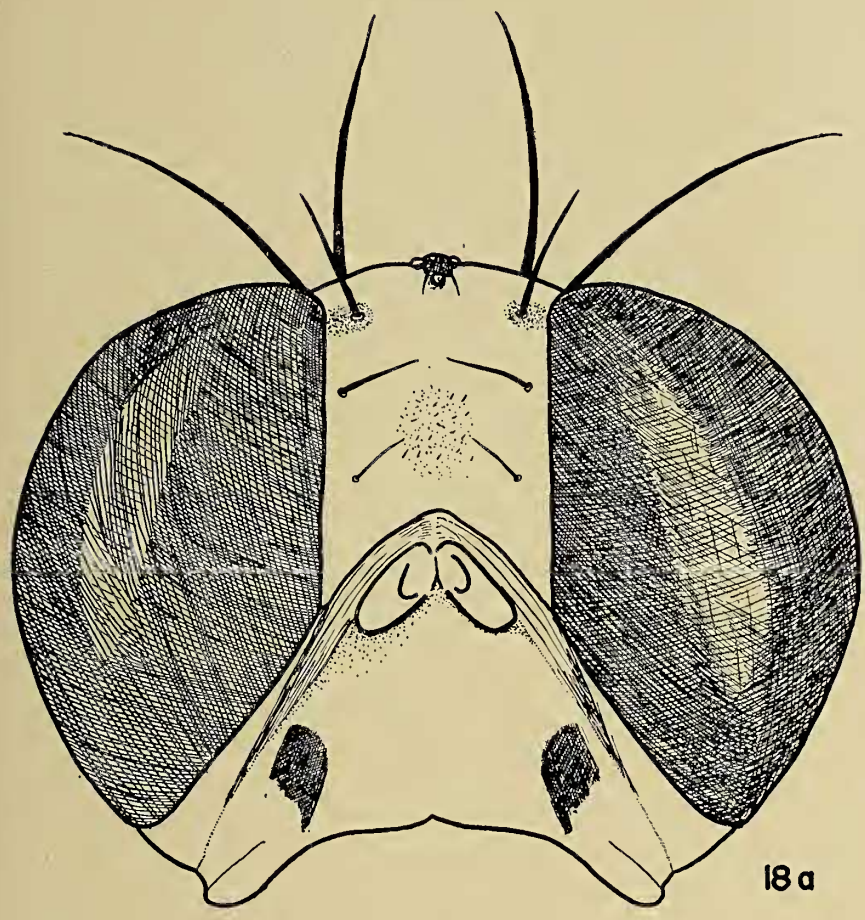


FIG. 18. *Dacus* (*Strumeta*) *kraussi* n. sp.: a, head, front view; b, ovipositor, full length; c, apex of ovipositor.

all black. In *D. barringtoniae* the abdomen is largely reddish with no black markings or crossbands.

MALE. *Head:* All rufous except for the shining black facial spots. The front is about two times longer than wide and is just slightly discolored in the median portion. Most of the head bristles are brownish-red, the fronto-orbital bristles are black. There are two pairs of inferior fronto-orbitals and one pair of superiors. The occiput is entirely pale. The facial spots (Fig. 18*a*) are moderately large, suboval in shape, and indistinctly pointed below; often drawn out into a distinct point as in *fagraeus*. *Thorax:* Chiefly rufous, with the usual pale yellow on the humeri, notopleura, etc., and with a yellow vitta on each side of the mesonotum from the suture to the posterior supra-alar bristles. The mesonotum has a narrow shining reddish-brown to blackish line extending down each side (inside the lateral yellow vittae) from the inner edge of each humerus to the scutellum. A median longitudinal vitta is also set off on the mesonotum by a subshining yellow-red line bisecting the grayish pruinosity which covers the dorsum. The bristles are typical of the subgenus. The metanotum is reddish-brown on the sides, yellowish in the middle. The mesopleural stripe is rather narrow and is not markedly expanded on the top portion and is scarcely broader than the notopleural calli. The halteres are clear yellow. *Legs:* All yellow except for brownish discolorations on the

hind coxae. The spurs of the middle tibiae are reddish black. *Wings:* Costal band grayish-brown and distinct through the third and fourth sections of the costa (cells Sc and R_2) and along the costal border through the apex of cell R_3. The band actually extends through most of cell R_3 but is faint and not distinct below vein R_3. The band extends just a short distance into cell R_5. The cubital streak is broad and distinct brownish in color. It fills all of the basal portion of cell M_4, nearly to the top of the m–cu crossvein. The brown colored portion of the streak ends at about the apex of the cubital cell and blends into the typical gray to blackish coloring along vein Cu_1+1st A. The narrowed portion of cell Cu is slightly more than two times longer than the distance from the apex of the cell to the wing margin. A distinct lobe is present at the tip of Cu_1+1st A. There is no distinct spot present at the tip of vein M_{3+4}. Venation otherwise as given in the general discussion. *Abdomen:* Chiefly black or dark colored. The first tergum is brown to black on the basal three-fourths, with a yellow band across the apex. The second tergum has a brownish band across the basal one-third to one-half and is yellow to whitish on the apical portion. The third tergum is entirely shining black and has the usual row of black cilia on each side. The fourth tergum is broadly yellowish to slightly discolored brownish-yellow down the middle portion and shining black on the sides. The fifth tergum has a large shining black spot on each side; the median part and the apical one-third are all yellow.

Length: Body, 6.7 mm.; wings, 6.0 mm.

FEMALE. The brownish coloration of the cubital streak extends well beyond the apex of the cubital cell, about halfway to the wing margin. The cubital cell is about one and one-third times longer than the distance from the apex of the cell to the wing margin. *Ovipositor:* Reddish-yellow to brownish in color and very conspicuous. In undissected specimens the ovipositor extends beyond the apex of the fifth segment, a distance about equal to the combined lengths of segments 3 to 5. The basal segment of the ovipositor (segment 7) is distinctly longer than segment 5. The fully extended ovipositor is 6.0 mm. long (Fig. 18*b*). The piercer is about 2.0 mm. (Fig. 18*c*) by about 0.2 mm. wide and tapers gradually from a point well in front of the apex of the oviduct. The oviduct extends to within 0.2 mm. from the tip of the ovipositor. Four pairs of preapical setae, two long and two short, are well developed. The posterior pair is located slightly more than twice its length or approximately 0.064 mm. from the apex. The inversion membrane is 2.4 mm. long by about 0.29 mm. wide. The rasper extends to within about 0.85 mm. of the base of the segment (Fig. 18*b*). The basal segment is about 1.64 mm. long, measured on a midline, and the spiracles are located 0.32 mm. from the base of the segment, measured on the lateral margins.

Length: Approximately the same as in the male.

Holotype male and allotype female: Deeral, Queensland, ex *Acmena macrocarpa*, June, 1949. Approximately 500 specimens are on hand, same data as type; 300 are being designated as paratypes. Over 100 specimens are also on hand from the following localities and hosts: Cairns, Queensland, ex *Eugenia branderhorstii* and *E. tierneyana*, Jan.–Feb., 1950; Atherton Tableland, Queensland, ex *Schizomeria whitei*, *Eugenia luehmannii*, and *Endiandra compressa*, Nov., 1949, and March, 1950; Babinda, Queensland, ex *Arytera* sp.? Sept., 1949; Garradunga, Queensland, ex *Rhodomyrtus macrocarpa*, Nov., 1949, and ex *Eugenia suborbicularis*, Aug., 1949; Cairns, Queensland, ex *Psidium guajava*, June, 1949, and March, 1950; Atherton Tableland and Julatten, Queensland, ex *Castanospora alphandii*, Dec., 1949; near Oak Beach, North Queensland, ex *Thevetia peruviana*, Feb., 1950; Clump Point, Queensland, ex *Eugenia cormiflora*, July, 1949; also Cairns, same host as the last, Dec., 1949.

Holotype, allotype, and a series of para-

types are in the United States National Museum collection. Paratypes are also being deposited in the following collections: Bishop Museum, Honolulu, T. H.; Board of Agriculture and Forestry, Honolulu, T. H.; Hawaiian Sugar Planters' Association, Honolulu, T. H.; University of Hawaii, Honolulu, T. H.; American Museum of Natural History; California Academy of Sciences; University of Berlin (Dr. M. Hering); and the collection of H. K. Munro, Pretoria, South Africa.

Dacus (Strumeta) laticaudus Hardy

Strumeta fuscatus Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 5–6. This name is preoccupied in *Dacus* by *D. fuscatus* Wiedemann 1819. Zool. Mag. 1(3): 28.

Dacus (*Strumeta*) *laticaudus* Hardy 1950. Haw. Ent. Soc., Proc. 14(1): 87–89. New synonymy. The name is available, however, since *fuscatus* Perkins and May is a homonym.

The description of *D. laticaudus* was published before I had seen Perkins and May's paper. From the original description of *fuscatus* Perkins and May it would appear that the two are distinct species distinguishable by several characters. Figure 2 of Perkins and May (1949) shows the r–m crossvein of *fuscatus* as being strongly sinuate. The crossvein in the specimens described as *laticaudus* is nearly straight. Perkins and May's description states that the abdomen is "entirely black except for dark brown area on posterior median portion of second tergite; ovipositor shiny dark brown . . . shiny spot on fifth tergite, black in female and brown in male." The large series of specimens at hand has a black longitudinal vitta extending down the middle of terga 3 to 5. The shining spots on the fifth tergum are rufous; the ovipositor is also pale colored. The original description of *fuscatus* also indicates that the mesonotum is extensively brown to black. It is predominantly rufous in the specimens of *laticaudus*.

I have received specimens of *D. fuscatus* (Perkins and May) from Mr. May, and he has also discussed the species in correspondence. He has reported that "the r–m crossvein in the type is not as sinuate as I have wrongly shown in my drawing. Although somewhat sinuate in the type male, for the type female the vein is almost straight." This is apparently a variable character. The median black vitta on the fourth and fifth terga is present on the specimens sent by Mr. May (this was not shown in his figure 2, or mentioned in the original description).

The species has been adequately described and figured in the publications mentioned above. The most distinctive characteristics of the species are the fumose r–m crossvein and the short stubby ovipositor of the female.

TYPE LOCALITY: Cairns, Queensland, ex *Sideroxylon obovatum*.

Type in the University of Queensland collection.

The specimens in the Krauss collection were from near Deeral, Queensland, ex *Planchonella* sp.

Dacus (Strumeta) manskii (Perkins and May)

Fig. 19*a*, *b*

Strumeta manskii Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 3–4.

This species is remarkably similar to *D. recurrens* (Hering) described from New Guinea. Apparently it is best distinguished by the chiefly rufous mesonotum. The writer sent specimens of *D. manskii* to Dr. Hering for comparison with the type of *D. recurrens*, which was deposited in the Hungarian Museum. The type was not available, but Dr. Hering studied the specimens and indicated that *manskii* is evidently a distinct species and can be separated by the following characters: The mesonotum is reddish-yellow in *manskii* and black with gray pollen in *recurrens*; the second abdominal tergum has a black crossband in *manskii* and only black spots in *re-*

currens; the black lateral spots on the hind border of the third tergum "not reaching" in *recurrens* (probably he means not continuous across the segment) and "in *manskii* reaching, continued on fourth and fifth terga." He says also that *manskii* differs by lacking the brown spot at the lower eye margin and in having shorter wings ("wing 5 mm. [in *recurrens*] and 3.6 mm. in *manskii*"). The brown spots are usually present below the eye margin, and all the specimens of *manskii* on hand have a wing length of 5.0–5.4 mm. The coloration of the thorax shows some variation, and some specimens have extensive black markings on the dorsum as well as on the pleura. *D. manskii* may possibly be a synonym or a subspecies of *recurrens*. Mr. May, in correspondence, stated that he did not consider the darker or lighter colorings to be of any value in this case since there is considerable variation depending upon the age (before killing) of the specimen. One specimen (from the type locality and host) received for study from Mr. May has the mesonotum extensively blackened and would fit the original description of *recurrens* very closely. It will be necessary to study specimens of *recurrens* from New Guinea in order to be sure that these are synonyms.

This species is distinguished from all other known Australian Dacinae by the conspicuous S-shaped band through the median part of the wing (see Perkins and May, 1949:4, fig. 1, and Hering, 1941*a*:47, fig. 2). *Wings:* The band extends transversely across the wing from vein R_{4+5} through the r–m crossvein to the wing margin just below the apex of vein M_{3+4}; it then extends dorsally along the m crossvein into cell R_5 nearly to vein R_{4+5}; then it curves downward again, extends along vein M_{1+2} and ends in the wing margin just below the apex of this vein. The first two costal cells are brownish-yellow-fumose and are densely covered with microtrichia except in the basal part of the first cell. The costal band is very broad, filling all of cell R_3. The cubital streak is broad, filling all of the basal part of cell M_4 up to the top margin of the m–cu crossvein. The narrowed portion of the cubital cell is slightly more than three times longer than the distance from the apex to the wing margin in the males and about two times longer in the females. *Thorax:* Chiefly reddish-yellow, typically with a pair of sublateral shining black stripes on the mesonotum just inside the postsutural yellow stripes. In the series at hand the coloration of the thorax varies considerably from specimens which are almost entirely reddish with brownish markings on the dorsum to those which have the

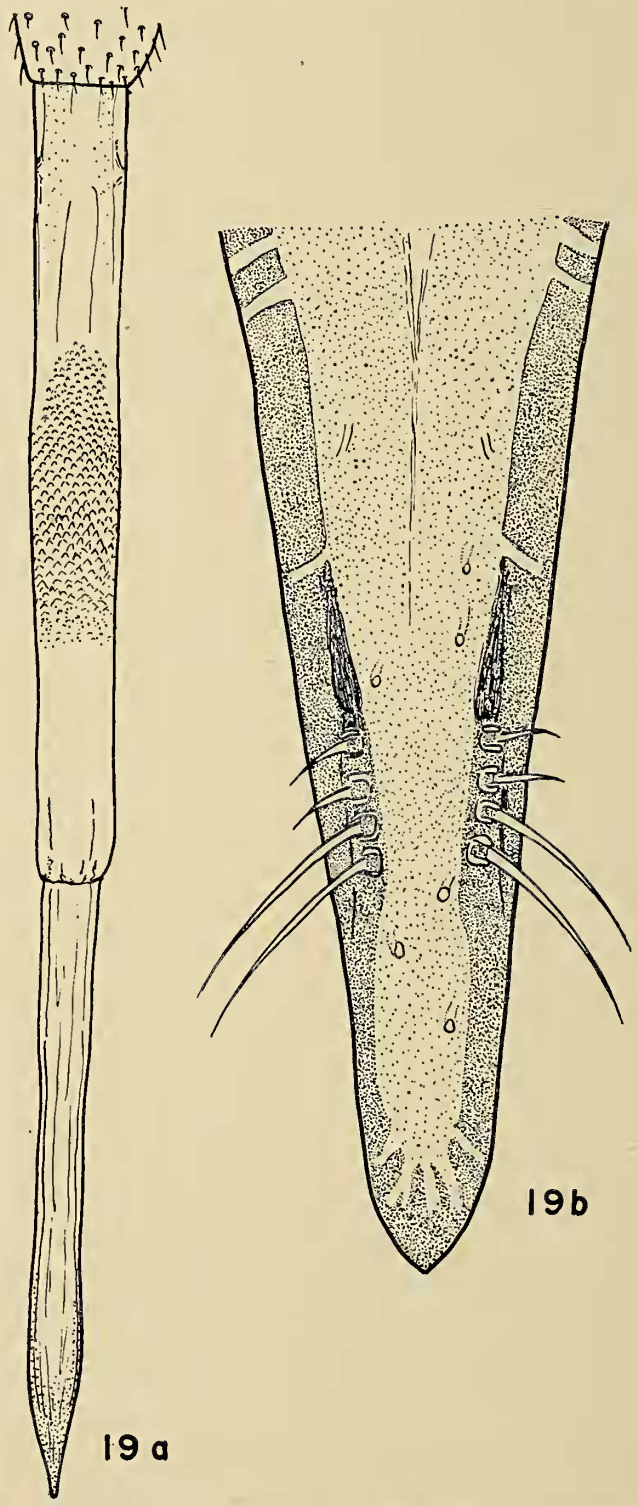


FIG. 19. *Dacus* (*Strumeta*) *manskii* (Perkins and May): a, ovipositor, full length; b, apex of ovipositor.

mesonotum chiefly blackish and grayish pollinose as in *recurrens*. *Abdomen:* First tergum brown on the basal three-fourths, black on the lateral margins. This black margin continues posteriorly and runs into the black band on the second tergum. Second and third terga with moderately broad black bands across their bases. The black crossband on the third expands laterally, covers all of the side margins, and extends posteriorly over the lateral margins of terga 4 and 5, narrowing rather sharply as it approaches the apex of the abdomen. A broad black vitta extends down the median part of the abdomen from the basal band on the third tergum to the apex of the fifth tergum. The fifth segment is all rufous except for the extreme lateral margins and the median vitta. *Ovipositor:* The exposed portion of the ovipositor is about equal in length to segments 4 and 5 combined. The extended ovipositor is long and slender (Fig. 19*a*) reaching a length of about 6.2 mm. The piercer (Fig. 19*b*) measures appoximately 1.8 mm. long by 0.2 mm. wide. The oviduct extends to within about 0.28 mm. of the apex, and the setae are situated about 0.05 mm. from the apex of the piercer. The distance from the distad pair of setae to the apex is equal to about two times the length of the plate bearing the setae or to the lengths of the longest setae. The inversion membrane is about 2.0 mm. long by 0.25 mm. at its widest point. The scales of the rasper extend to within about 0.9 mm. of the base of the eighth segment. The basal segment of the ovipositor measures about 1.4 mm. in length. The spiracles are situated approximately 0.3 mm. from the base of the segment.

Length: Body, 5.4–6.2 mm.; wings, 5.0–5.7 mm.

TYPE LOCALITY: Cairns, bred from *Strychnos bancroftiana*. No type designated.

Type series in the Queensland Museum.

Thirteen specimens are in the Krauss collection from: Babinda, Queensland, ex *Strychnos* sp., Nov., 1949, and Iron Range, Queensland, ex *Strychnos* sp.(?) prob. *bancroftiana*, Aug., 1949.

Dacus (Strumeta) mayi new name

Fig. 20*a*, *b*

Strumeta bilineata Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 7–8. This name is preoccupied in *Dacus* by *D. bilineatus* Walker 1860. Linn. Soc. Lond., Proc. 4: 150.

No specimens were present in the Krauss collection, but specimens for study have been received from Mr. Alan May. A brief description and figures of the ovipositor are given here in order to compare this with the related species that are discussed.

D. mayi is related to *D. breviaculeus* and differs from it in the ways discussed under that species. The ovipositor is comparatively short

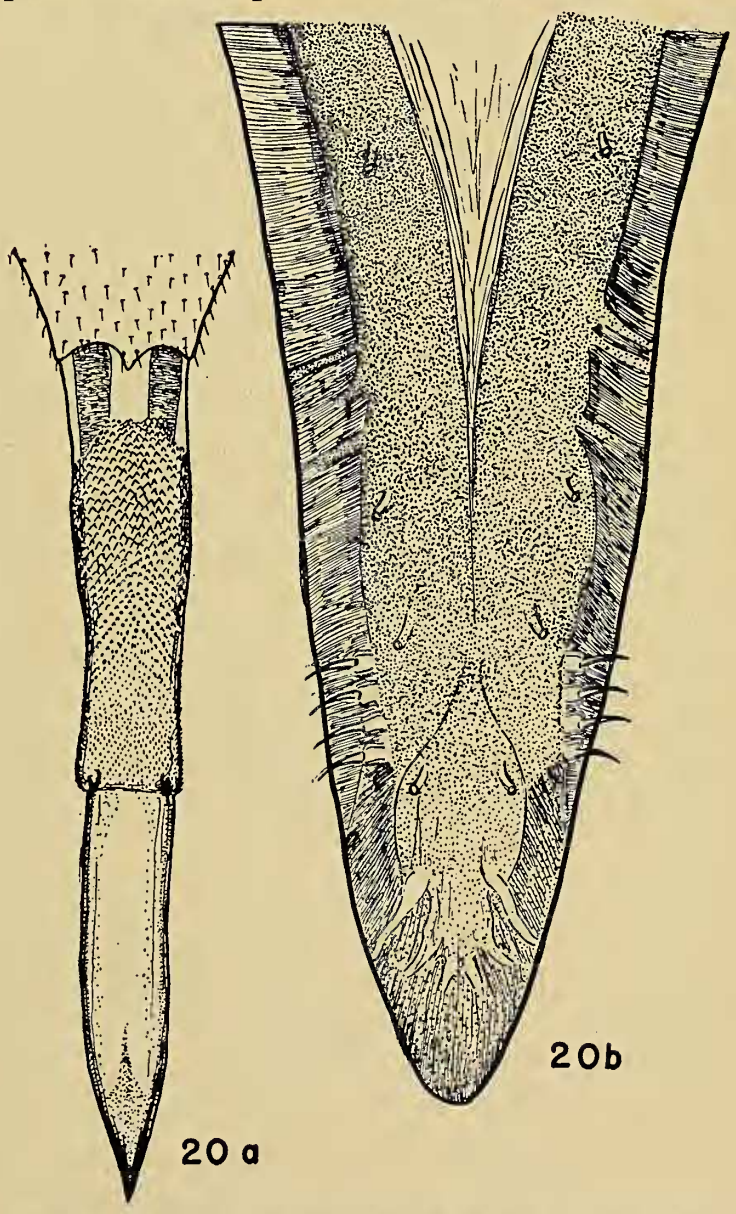


FIG. 20. *Dacus* (*Strumeta*) *mayi* n. name: a, ovipositor, full length; b, apex of ovipositor.

and thick; it is not broad, however, as in *breviaculeus* (cf. Figs. 12*b* and 20*a*). In undissected specimens the extended portion is equal to or slightly longer than segment 5 and not scarcely extended beyond segment 5 as in *breviaculeus*. The extended ovipositor (Fig. 20*a*) measures approximately 3.5 to 3.7 mm. The piercer is 1.1 to 1.2 mm. long by about 0.26 mm. at its widest point. The oviduct extends to within about 0.18 mm. from the apex of the piercer (Fig. 20*b*), and the setae are about 0.05 mm. from the apex; this latter distance is comparable to about two times the length of the plate bearing the setae. On each side of the base of the piercer a pair of sclerotized lobes extends a short way inside the apical portion of the inversion membrane (segment 8). The inversion membrane measures 1.2 to 1.4 mm. in length by about 0.38 mm. at its widest point (at the base). The scales are thorn-like and extend to within about 0.2 mm. of the base of the segment. The apical portion of the inversion membrane is densely covered with short hairs, especially visible on the sides. The basal segment of the ovipositor is about 1.2–1.3 mm. long by 1.1 mm. across its hind margin. The spiracles are located about 0.3 mm. from the posterior lateral margins of the segment.

TYPE LOCALITY: Cairns, Queensland, bred ex *Sideroxylon obovatum* (R. Br.).

Type in the University of Queensland collection.

Dacus (Strumeta) musae (Tryon)

Fig. 21*a–c*

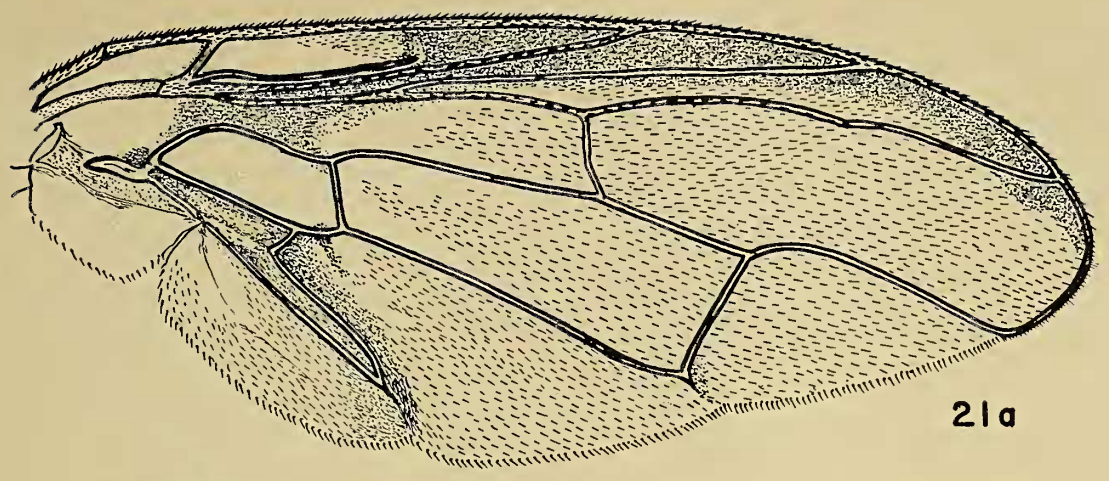
Chaetodacus musae Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 197–199.

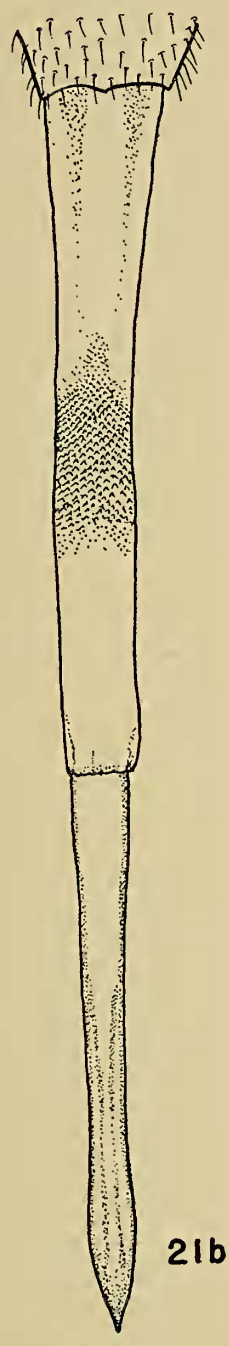
This species is related to *D. endiandriae* (Perkins and May). It is distinguished by the pale-colored abdomen which lacks the central black vitta and by the striking differences in the female ovipositors (Figs. 15*a* and 21*b*).

MALE. *Head:* All rufous, except for the black facial spots and ocellar triangle and for the brownish discoloration in the center of the front. The front is slightly expanded on the lower half and is one and three-fourths times longer than wide. Two pairs of inferior fronto-orbital bristles are present. The facial spots are oval and are situated about half their length from the oral margin. The third antennal segment is brownish, about one and one-fourth times longer than the face, and is slightly more than four times longer than wide. The head bristles are brown to black. *Thorax:* The dorsum is chiefly black, especially in the median portion. The area between the postsutural yellow stripes is grayish pubescent and is divided off by the usual three longitudinal subshining lines. The scutellum is all yellow except for a very narrow brown line across its base. The vertical yellow stripe through each mesopleuron is expanded dorsally and extends over all but a small portion of the top margin of the sclerite. The metanotum is black with a reddish central portion. *Legs:* Entirely rufous except for some brownish discoloration on the coxae and hind tibiae. *Wings:* The first two costal cells are hyaline and devoid of microtrichia except in the outer part of the second cell. The costal band is rather broad but does not extend to vein R_{4+5} except at its apex (Fig. 21*a*). The cubital streak is broad, fills all of the base of cell M_4, and extends about halfway along the m–cu crossvein. The narrowed portion of the cubital cell is three times longer than the distance from the apex to the wing margin. *Abdomen:* Almost all yellowish to rufous. The first tergum is brownish, especially on the sides, and the second tergum has a reddish-brown subbasal band. The third tergum usually has a narrow, black basal band, distinct especially at the sides. In some specimens this tergum is all pale, in others just a small anterior lateral spot of black is present on each side.

Length: Body, 7.0–7.3 mm.; wings, 6.0–6.2 mm.

FEMALE. The narrowed portion of the cubital cell is two times longer than the section to the margin beyond the apex. Some specimens have a very faint indication of a vitta





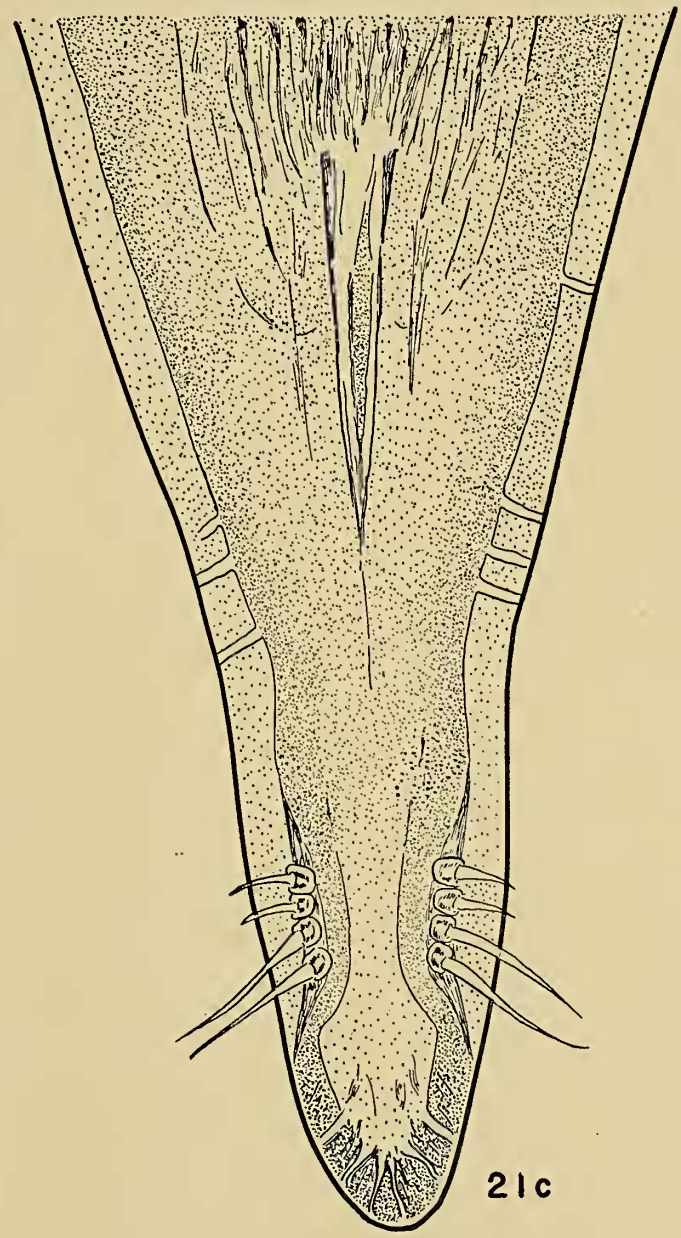


FIG. 21. *Dacus* (*Strumeta*) *musae* (Tryon): a, wing; b, ovipositor, full length; c, apex of ovipositor.

down the middle of terga 4 and 5. *Ovipositor:* Elongate and conspicuous, the visible portion equal to the combined lengths of terga 4 and 5. It is distinctive even in *in situ* specimens because of the position of the pre-apical setae. The extended ovipositor (Fig. 21*b*) measures about 5.4 mm. in length. The piercer is approximately 1.8 mm. long by 0.2 mm. wide. It tapers rather abruptly just beyond the apex of the oviduct. The oviduct extends to within 0.5 mm. of the tip of the piercer. The setae are conspicuous and are located just before the apex of the piercer. They are about 0.04 mm. from the apex, this

distance being just slightly more than the length of the plate bearing the setae or the lengths of the longest setae (Fig. 21*c*). The inversion membrane is about 2.0 mm. long by 0.32 mm. wide. The scales of the rasper are sharp-pointed and extend to within approximately 0.9 mm. from the base of segment 8. The basal segment is 1.6 mm. long and the spiracles are 0.27 mm. from the posterior lateral margins.

TYPE LOCALITY: Cardwell, Queensland, ex *Musa banksii*.

Type in the Queensland Museum.

Over 1,000 specimens are in the Krauss collection from the following localities: Cairns, Queensland, ex banana, Jan.–Feb., 1950; Mossman Gorge, Queensland, ex *Musa banksii*, Feb., 1950; near Deeral, Queensland, ex banana, June, 1949; near Kuranda, Queensland, ex *Musa banksii*, Sept., 1949; Mossman, Queensland, ex *Musa banksii*, March, 1950; one specimen reared from guava, Cairns, Queensland, April, 1950; one specimen reared from *Capparis lucida*, Ellis Beach near Cairns, Jan., 1950; and two specimens from Cairns, ex papaya, Feb., 1950.

Dacus (Strumeta) pallidus
(Perkins and May)
Fig. 22*a*, *b*

Strumeta pallidus Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 10–12.

A predominantly pale-colored species related to *D. barringtoniae* (Tryon). It is readily distinguished by the presence of a black vitta down the middle of abdominal terga 3 to 5 and by the very striking differences in the ovipositors as shown in Figures 11*a* and 22*a*.

The species has been adequately described by Perkins and May, except for the genital characters. The following description points out the diagnostic characters. *Head:* The front is broad; it is slightly less than the width of one eye and about one and three-fourths times longer than wide. There are two pairs of inferior fronto-orbital bristles. One specimen in the series at hand has three bristles on one side and two on the other. The facial spots are oval and are sometimes pointed below. In a series of specimens from Iron Range about 50 per cent had no facial spots; they were evidently teneral. *Thorax:* Chiefly reddish with the usual yellow markings, the sternopleura largely brown to black. There is also a small black spot behind the yellow coloration of the metapleura just in front of the halteres and a brown to blackish spot on some specimens on the hypopleura just above the hind coxae. In one specimen at hand a pair of dorsocentral bristles are distinctly developed; these are placed anterior in position to the prescutellars and are about half as long as the other thoracic bristles. *Wings:* The first two costal cells are hyaline and devoid of microtrichia except in the apical portion of the second. The costal band extends under vein R_3 through the dorsal half of cell R_3. In the apical portion it extends over one-third the distance between the ends of veins R_{4+5} and M_{1+2}. The cubital streak is more faintly yellow-brown than the costal band, and the yellowish coloring fades out at about the end of the cubital cell. In the female the narrowed portion of the cubital cell is equal to or slightly longer than the distance from the end of the cell to the wing margin. In the male this cell is distinctly more than two times longer than the distance to the margin. *Abdomen:* Chiefly reddish with a black vitta down the middle of terga 3 to 5 and a narrow brown to black basal band on the third tergum. This basal band broadens laterally and covers the side margins of this tergum. *Ovipositor:* Conspicuous and well developed. The extruded portion (in pinned specimens) is about equal in length to the last three segments of the abdomen. The extended ovipositor (Fig. 22*a*) measures about 5.4 mm. The piercer (Fig. 22*b*) is 1.8 mm. long by 0.19 wide and is gradually tapered on the apical third. The apex of the oviduct is about 0.6 mm. from the apex of the piercer. The setae are well developed and are situated about 0.25 mm. from the apex of the piercer.

FIG. 22. *Dacus* (*Strumeta*) *pallidus* (Perkins and May): a, ovipositor, full length; b, apex of ovipositor.

This distance is equal to about twice the length of the longest pre-apical setae or two to three times longer than the plate bearing the setae. The inversion membrane measures about 2.1 mm. long by 0.3 mm. wide. The scales of the rasper extend to within about 0.75 mm. of the base of the segment. The basal segment is about 1.5 mm. long by 1.1 mm. at its broadest point. The spiracles are 0.14 mm. from the base of the segment, measured on the lateral margin.

Length: Body, 6.4–6.6 mm.; wings, 5.8–6.0 mm.

TYPE: No type or type locality was designated. It was described from a series bred from fruits of *Sarcocephalus cordatus* Mig. collected at Cairns and Brisbane, Australia.

Type series in the University of Queensland collection.

The Krauss collection contained a large series of this species from Cairns, Queensland, ex *Sarcocephalus cordatus*, Mar.–Apr., 1950, and 20 specimens from Iron Range, Queensland, ex "undet. yellow fruit," Aug., 1949.

Dacus (Strumeta) pulcher (Tryon)

Fig. 23*a*, *b*

Bactrocera pulcher Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 206–207.

This species superficially resembles *Dacus* (*Heterodaculus*) *visendus* n. sp. because of the similarity in the wing markings. The two species are not related, however, and could not be confused. The species appears to be related to *D. strigatus* (Perkins) but is readily separated by the brown costal cells, the yellow notopleural calli, and the more anteriorly placed r–m crossvein.

MALE. Chiefly black or dark colored species. *Head:* Rufous, except for the blackened occiput, the black facial spots, and the discolorations on the front. The front is about one and one-half times longer than its greatest width. The front is gradually expanded on the lower half, and the median tumescence is discolored with brown. Two pairs of inferior fronto-orbital bristles are present on the specimen at hand. In the original description Tryon stated that three pairs of inferior frontals were present. All of the head bristles are black. The facial spots are elongate, are equal to half the length of the face, and extend to the oral margin. The first two antennal segments are rufous, tinged lightly with brown. The second segment is comparatively long, being one and one-half times longer than the first segment and nearly half as long as the third. The third segment is brown in color, is almost one and two-fifths longer than the face, and is nearly five times longer than wide (Fig. 23*a*). *Thorax:* Dorsum black except for the humeri, notopleural calli, lateral yellow postsutural vittae, and the scutellum. The median portion

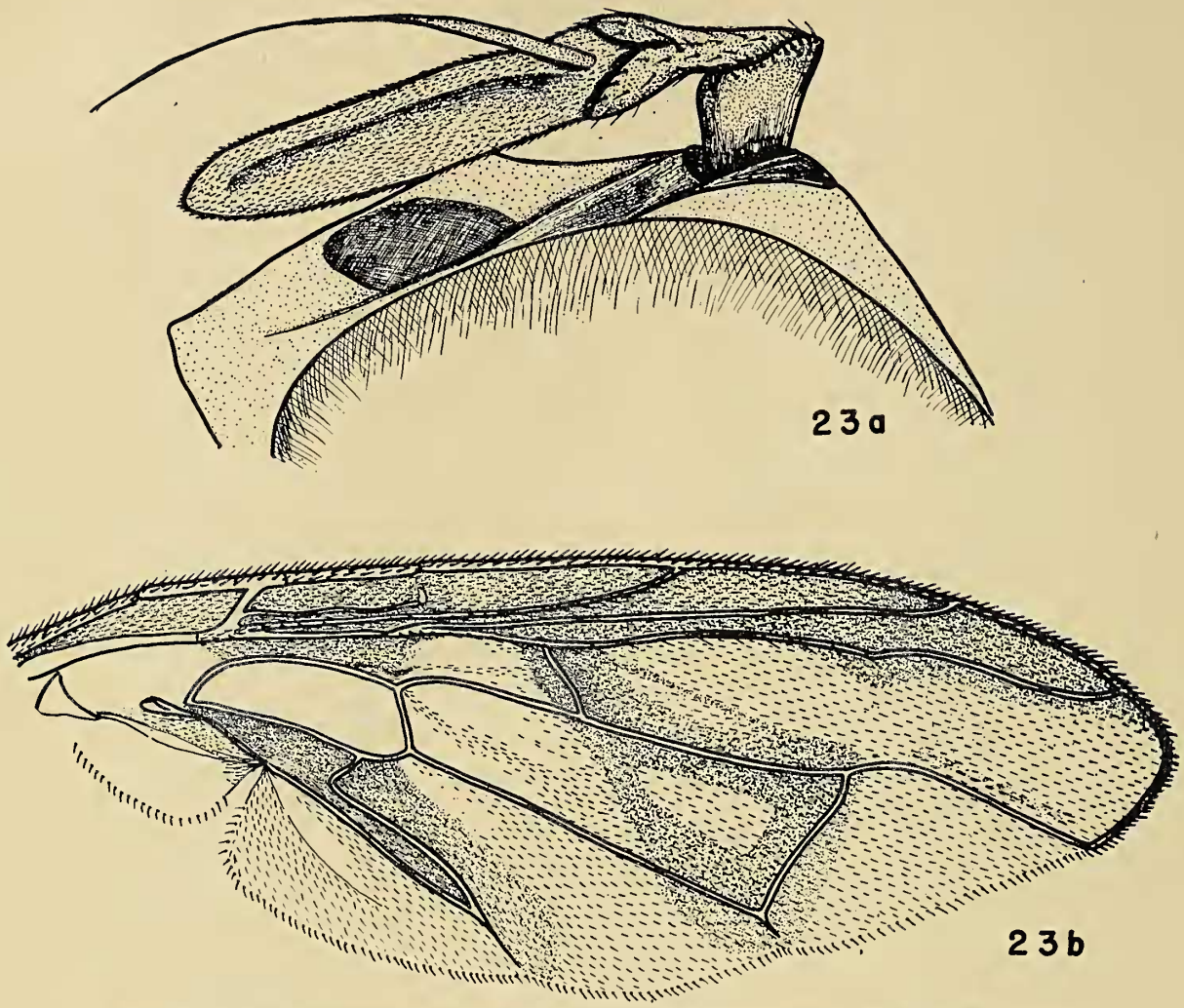


FIG. 23. *Dacus* (*Strumeta*) *pulcher* (Tryon): a, head, lateral; b, wing of male.

is densely covered with grayish pubescence which is very indistinctly divided by three narrow, subshining longitudinal vittae. The lateral yellow stripes are narrow, extend from the suture to the inner supra-alar bristles, and are slightly discolored with brownish on the posterior half. The yellow coloring extends a short distance along the suture on each side. The scutellum has a broad black band across its base. The scutellar bristles are about as widely spaced as the prescutellars. The yellow mesopleural stripe is almost parallel sided, just gradually expanding toward the top margin. The anterior half of each mesopleuron is shining black. *Legs:* Coxae black, trochanters discolored with brown, legs otherwise yellowish-red. *Wings:* Costal band and cubital streak very broad and dark brown-fumose. The first two costal cells are concolorous with the remainder of the costal band and very densely and completely covered with microtrichia. The costal band fills all of cell R_3 and extends a short distance below vein R_{4+5} on the outer half of that vein. The cubital streak fills all of the basal part of cell M_4 almost to the top margin of the m–cu crossvein and extends in a broad, almost parallel-sided band to the wing margin. A broad crossband extends obliquely through the middle of the wing. This runs from vein R_{4+5} at the r–m crossvein to the wing margin at the apex of vein M_{3+4}. This takes in the r–m and m crossveins and fills all of the apical half of cell 1st M_2 except for a triangular-shaped hyaline spot in the center of this portion (Fig. 23*b*). The r–m crossvein is straight but oblique in position; it is situated anteriorly to the middle of cell 1st M_2 and well before the apex of vein R_{1+2}. In the male the narrowed portion of the cubital cell is two times longer than the portion from the apex of the cell to the wing margin. *Abdomen:* Almost all black, the apical half of the second tergum whitish to yellowish, and the apical half of the fifth tergum rufous, discolored with brown to black on the anterior portion of this band. The integument is densely covered with minute punctules.

Apparently the female has not been described, and no specimens have been seen during this study.

Length: Body, 7.0 mm.; wings, 6.0 mm.

TYPE LOCALITY: Glasshouse Mountain, South Queensland.

Type in the Queensland Museum. One male specimen is in the Krauss collection from Atherton Tableland, Queensland, ex *Planchonella* sp., Sept., 1949.

Dacus (Strumeta) tryoni (Froggatt)

Fig. 24*a*, *b*

Tephritis tryoni Froggatt 1897. Agr. Gaz. N. S. Wales 8: 410–412, fig. 18.

Chaetodacus tryoni var. *musa* Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 187.

Chaetodacus tryoni var. *juglandis* Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 188.

Apparently this species is quite variable in color and it is questionable that the designation of color varieties has any value in this case. In some series of *D. tryoni* I have found that a high percentage will often fit the variety *sarcocephali* and in some cases the individuals intergrade into a more melanistic form which appears to be typical *melas* (Perkins and May). The variety which Tryon described as *musa* appears to be the same as typical *tryoni*, and his variety *juglandis* is evidently an intergrading form between typical *tryoni* and variety *sarcocephali*.

Dacus tryoni has been treated frequently in the Australian literature and for the most part the taxonomic details have been adequately covered. The following discussion gives the most important characteristics of the species. The species is well defined by the yellow-brown-fumose costal cells which are densely covered with microtrichia. The female ovipositor is also distinctive and is very useful in separating this species. The typical form has the thorax chiefly rufous without longitudinal black vittae or black markings on the mesonotum.

Head: The facial spots are circular to oval and are often somewhat pointed on the lower margin. The shape of the spots does not appear to be of importance in distinguishing this species or in setting off varieties. *Thorax:* The ground color of the median portion of the mesonotum is yellowish (well differentiated from the cream-colored lateral vittae etc.), bounded on each side by reddish to reddish-brown. Specimens often have a pair of short brown to black stripes arising from between the outer and inner scapular bristles and extending about the length of the humerus from the anterior margin of the mesonotum. When these black marks extend the full length of the mesonotum, the specimen fits in the *sarcocephali* group. The humeri are clear yellow to cream colored. In some specimens they are discolored with brownish and definitely intergrade into the *humeralis* form. *Wings:* The most striking characteristic is the presence of microtrichia throughout the apical portion of the first costal cell and through all of the second. These two sections are usually brownish-fumose, concolorous with the costal band. In teneral specimens the brownish coloring may be absent, but the presence of the microtrichia (best seen at magnifications of 90 to 112×) will differentiate the species. The costal band is distinct but extends only faintly below vein R_3 except at the wing margin. The cubital streak is broad and well developed. It fills all of the basal portion of cell M_4. The narrowed portion of the cubital cell is about one and one-third times longer than vein Cu_1+1st A in the females, and in the males the narrowed portion of the cell is slightly over two times longer than Cu_1+1st A. *Abdomen:* Variable in coloration, typically the third tergum is all brownish to black, the fourth is brown to black on the sides, and the fifth is brown on the posterior lateral margins. A dark-colored vitta extends down the middle of terga 3 to 5. Tergum 2 has a brown to black subbasal band and the basal three-fourths of the first segment is brown. In the specimens at hand the coloring of the abdomen varies from nearly all rufous to nearly all shining black. *Ovi-*

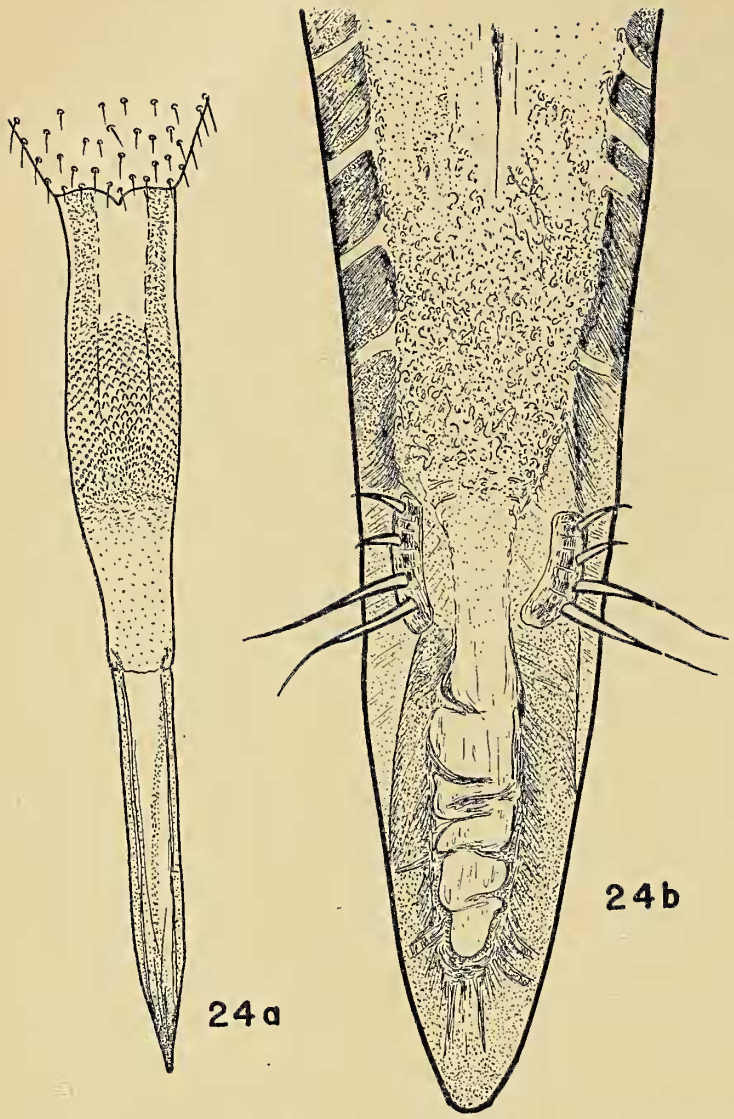


Fig. 24. *Dacus* (*Strumeta*) *tryoni* (Froggatt): a, ovipositor, full length; b, apex of ovipositor.

positor: Moderately short in *in situ* specimens; the visible portion is about one and one-half times longer than the fifth tergum. The extended ovipositor (Fig. 24*a*) is about 4.0 mm. long. The piercer measures about 1.27 mm. long by 0.19 mm. at its widest point. The setae are located about 0.09 mm. from the apex of the piercer (Fig. 24*b*), this distance being comparable to about four times the length of the plate bearing the setae or four times the length of the longest setae. The apex of the oviduct is about 0.26 mm. from the tip of the piercer. The inversion membrane is about 1.5 mm. long by 0.3 mm. wide at its base. The scales of the rasper are broad and rather blunt and extend to within 0.45 mm. from the base of the segment. The basal segment is about 1.2 mm. long by 1.07 mm. across its hind margin. The spiracles are located about 0.28 mm. from the posterior lateral margin of the segment.

Length: Body, 6.0–7.0 mm.; wings, 5.0–6.0 mm.

TYPE LOCALITY: Tenterfield, New South Wales.

Type in the Queensland Museum.

Several thousand specimens are in the Krauss collection from the following localities and hosts: Palm Beach, near Cairns, Queensland, ex *Terminalia melanocarpa*, *T. muelleri*, and *Mimusops parvifolia*, Dec., 1949; near Gordonvale, Queensland, ex *Solanum seaforthianum*, Aug.–Dec., 1949; Garradunga, Queensland, ex *Eugenia suborbicularis*, Aug., 1949; Hartley's Creek, Queensland, ex *Polyalthia nitidissima*, Mar., 1950; near Atherton, Queensland, ex *Castanospora alphandii*, Dec., 1949; Julatten, Queensland, ex *Castanospora alphandii* and *Amorphospermum antilogum*, Dec., 1949; near Babinda, Queensland, ex guava; Atherton Tableland, Queensland, ex *Planchonella* sp., *Endiandra compressa*, *Solanum auriculatum*, *Rhipogonum papuanum*, *Aglaia sapindina*, and *Beilschmiedia obtusifolia*, Nov., 1949–Feb., 1950; Babinda, Queensland, ex *Endiandra compressa*, Nov., 1949; Mowbray River, Queensland, ex *Capparis lucida*, Feb., 1950; Ellis Beach, near Cairns, Queensland, ex *Terminalia catappa*, Feb., 1950, and ex *Dallachya vitiensis*, Jan., 1950; Ravenshoe, Queensland, ex peach and plum fruit, Dec., 1949; Gosford, New South Wales, ex *Actinidia chinensis* and "Feijoa," Apr., 1950; and Sydney, New South Wales, ex *Psidium cattleianum* var., *Eugenia pendula*(?), and *Hemicycla australiensis*, Apr., 1950.

Also reared from the following hosts at Cairns, June, 1949, to Mar., 1950: ex *Eugenia cormiflora*, *Eugenia jambos*, *Psidium guajava*, papaya, mango, *Annona reticulata*, *Terminalia muelleri*, *Terminalia catappa*, cashew, *Carambola*, *Castanospora alphandii*, and ex "reddish purple fruit ½ m. [inch?] diam."

Dacus tryoni var. **melas** (Perkins and May) new combination

Strumeta melas Perkins and May 1949. Univ. of Queensland, Dept. Biol. 2(14): 12–14.

I have not been able to find characters on the specimens available which will separate this as a distinct species. It apparently intergrades with var. *sarcocephali*, and in several series at hand it is impossible to place specimens which occupy a borderline position between the two forms. This is apparently just a melanistic form of *D. tryoni*. The female ovipositor and other structural characteristics of the specimens which have been studied are identical with typical *tryoni*. According to the original description, *Strumeta melas* Perkins and May is very close to *tryoni* var. *sarcocephali* "from which it differs in the shape of the facial spots and the colour of the mesonotum and abdomen. Though closely resembling *S. humeralis* in general colouration it differs in the colour of the humeral calli."

Specimens of *Strumeta melas* from the type locality have been sent to me for study by Mr. Alan May. In this series, as well as in other series at hand, the facial spots, from circular to pointed below, show the same variations in shape as in the typical form. They are definitely blacker than in var. *sarcocephali* but structurally do not seem to differ from typical *tryoni*. The range in size is also the same as in the typical form in the specimens at hand. The ovipositors appear to be identical.

TYPE LOCALITY: Not designated in original description. Described from "four specimens 'bred' from grapefruit in Gayndah, Nambour and Palmwoods."

Type series in the University of Queensland collection.

Typical *melas* are in the collection from many localities. In most cases they are mixed with series of typical *tryoni* and var. *sarcocephali*. Specimens are from Cairns, Queensland, "resting on guava fruit," Feb., 1950; Atherton Tableland, Queensland, ex *Eugenia* sp. (*luenmannii?*), Nov., 1949. Specimens are also mixed in with several of the series of typical *tryoni* reported above.

Dacus tryoni var. neohumeralis
new name

Chaetodacus humeralis Perkins 1934. Roy. Soc. Queensland, Proc. 45(9): 42–43. This name is preoccupied in *Dacus* by *D. humeralis* Bezzi 1915. Ent. Res. Bul. 6: 95.

I am quite skeptical about this form (or species?). Numerous specimens are on hand which fit the description of *Strumeta humeralis* Perkins, but they appear to be just specimens of *D. tryoni* with discolored humeri. The general body color in the series at hand varies from predominantly pale, as in typical *D. tryoni*, to chiefly black, as in *D. tryoni* var. *melas*. Specimens in the present collection compare exactly with specimens which had been determined as *D. humeralis* by Perkins. The ovipositor and other structural characteristics are identical with those of *tryoni*. Mr. Alan May feels that this is a distinct species. He has stated (in correspondence) that "*humeralis* Perkins can be separated quite readily from *tryoni*, particularly when you are handling either field specimens or fully coloured material. Young flies of *tryoni* do discolour and the humeral calli may change to brown as the pinned specimens age. However, *humeralis* has an extensive black pattern on the mesonotum while the humeral calli are also black." The specimens which Mr. May sent to emphasize his point showed the same variations in the color of the humeri present in the series at hand—from dirty yellow to brownish (not black). This may be entirely due to the age (before killing) of the specimens, but since I have not been able to find supporting structural differences I prefer to treat this as a variety of *tryoni*.

TYPE LOCALITY: Mackay, Queensland, ex *Passiflora suberosa*.

Type in the Queensland Museum.

Specimens are in the Krauss collection from the following localities and hosts: Ellis Beach, near Cairns, ex *Granophyllum falcatum*, Jan.; 1950, and ex *Capparis lucida*, Jan., 1950;

Cairns, same host and date as above, mango, Dec., 1949, and guava, Apr., 1950; across inlet from Cairns, ex "fruit plant No. 138,"[6] Feb., 1950; and near Hartley's Creek, N. Queensland, ex *Clausena brevistylus*, Feb., 1950. NOTE: In the longer series of specimens from the above localities and hosts the humeri vary in color from brown to yellow.

Dacus tryoni var. **sarcocephali** (Tryon)

Chaetodacus tryoni var. *sarcocephali* Tryon 1927. Roy. Soc. Queensland, Proc. 38(14): 188.

As discussed above, this is just a color variation of *D. tryoni*, and in many of the series at hand so many borderline specimens are present (also verging into var. *melas*) that it does not seem practical to break them down even into varieties. Since variety *sarcocephali* apparently is commonly accepted by the Australian workers, I am including it in this discussion. The variety is supposed to differ from typical *tryoni* by having distinct black markings on the mesonotum, according to Perkins and May, "comprising two dots and two streaks." They also say that the flies are mostly smaller in size. The size difference apparently is of no importance as no constant difference in size has been observed in the long series at hand. The ovipositors are identical with the typical form. Mr. May offered the following comments in one of his letters, "Re Tryon's 1927 paper and the varieties of *S. tryoni:* I have yet to go into this problem. . . . Should you regard var. *musa* and var. *juglandis* as true synonyms, then you would also treat var. *sarcocephali* on the same basis? I have yet to find differences of a structural nature, between *tryoni* and *tryoni* var. *sarcocephali*. Var. *juglandis* is quite a small fly in comparison to *tryoni* but that could be due to food." I may not be correct in treating the forms in this *tryoni* complex as I have, but the procedure followed here seems to be the most logical way of handling them.

TYPE LOCALITY: Brisbane, ex *Sarcocephalus cordatus* and *Psidium* sp.

Type in the Queensland Museum.

Typical *sarcocephali* are in the collection from Hartley's Creek, N. Queensland, ex *Polyalthia nitidissima* and *Ganophyllum falcatum*, Feb.–Mar., 1950 (some of these intergrade into var. *melas*); Atherton Tableland, Queensland, ex *Rhodamnia sessiliflora* and *Solanum seaforthianum*, Mar., 1950; Cairns, Queensland, ex guava, Mar., 1950 (intergrading into var. *melas*); near Hartley's Creek, N. Queensland, ex *Terminalia melanocarpa*, Mar., 1950 (smaller specimens intergrading in color toward var. *melas*); Ellis Beach near Cairns, Queensland, ex "plant 129,"[7] Feb., 1950; also mixed in with a large share of the typical *tryoni* reported above.

ACANTHONEURA Macquart

Acanthoneura Macquart 1843. Dipt. Exot. 3(3): 220.

This genus is closely related to *Rioxa* Walker but the aristae are short haired and just one pair of inferior fronto-orbital bristles is present. According to Malloch (1939) three species of *Acanthoneura* occur in Australia. Just one species, *A. australina* Hendel, was represented in the Krauss collection. It now appears that a fourth species, *A. bicolor* (Mq.), should be included here.

GENOTYPE: *Acanthoneura fuscipennis* Macquart.

KEY TO KNOWN AUSTRALIAN *Acanthoneura*[8]

1. Abdomen entirely black; thorax yellow-brown without black markings; wings with just one hyaline incision on the costa just beyond end of vein R_{1+2} and with two hyaline spots in

[6]Mr. Krauss reported that this plant was determined (from fruit only) as *Terminalia melanocarpa*, but he was doubtful of this determination. He stated that it came from a "large tree . . . dark purple fruit, ½ inch diameter, ¾ inch long, juicy purple pulp."

[7]The plant "was apparently lost en route to Mr. C. J. White, Government Botanist, Brisbane." Mr. Krauss said it came from a "small tree . . . small red fruit, 5/16 in. long, ¼ in. diameter, in large clusters."

[8]Adapted from Malloch (1939*a*).

cell R_5. . . . . *nigriventris* Malloch

Abdomen marked with yellow or rufous; mesonotum distinctly marked with black; if just a single hyaline incision is present on the costal margin, cell R_5 has three hyaline spots 2

2. With two hyaline incisions beyond vein R_{1+2}; r–m crossvein situated at about the middle of cell 1st M_2. . . . . *australina* Hendel

Just one hyaline incision on the costal margin; r–m crossvein situated at the apical two-thirds to three-fourths of cell 1st M_2. 3

3. Mesonotum marked with black on the sides and the hind margin; cell R_5 with two hyaline spots beyond the r–m crossvein. . . . . *acidomorpha* Hendel

Mesonotum with four black longitudinal vittae; cell R_5 with one spot beyond the r–m. . . . . *bicolor* (Macquart)

Acanthoneura australina Hendel

Fig. 25

Acanthoneura australina Hendel 1928. Ent. Mitteil. 17: 359.

This species is separated from the related species by the characters given in the above key. The pattern of the wing coloring is especially characteristic. The following notes are based upon the female; the male has apparently not been described.

Head: The front is rufous and is one and one-third times longer than wide; the width is almost equal to the eye width. The face is flat on the upper three-fourths and tumescent below. The antennae are broken off in the specimen at hand. *Thorax:* Yellow on the sides, scutellum, and the greater portion of the dorsum; the lateral and posterior margins of the mesonotum are black. The mesonotum is subshining lightly pollinose. The metanotum is chiefly black, faintly rufous in the middle. The dorsocentral bristles are placed distinctly behind the anterior supra-alars. The halteres are yellow. *Legs:* Entirely clear yellow. *Wings:* (Fig. 25.) The basal portion is chiefly brown. The first costal cell is brownish in the basal half to three-fourths and hyaline at the apex (to the h crossvein). The second costal cell is largely hyaline but is brown at its apex and base; the hyaline mark in the second costal cell extends across the wing as a wedge-shaped mark through cells R_2 and R and connects, rather indistinctly, with the narrow hyaline streak in the base of cell M_4, which bisects the r–m crossvein. The basal one-third of the subcostal cell is hyaline and the apical portion is brown. A wedge-shaped hyaline incision runs through the middle portion of cell R_2 (where vein R_{1+2} enters costa) and extends through three-fourths of cell R_3. A second hyaline incision is situated just beyond the first, extending just to vein R_3. Cell R_5 has an oval hyaline mark just above the m crossvein and another before the r–m crossvein. Cell 1st M_2 has a round hyaline spot in the middle near its apex and 2d M_2 has a hyaline streak extending obliquely from the wing margin three-fourths the distance through the middle

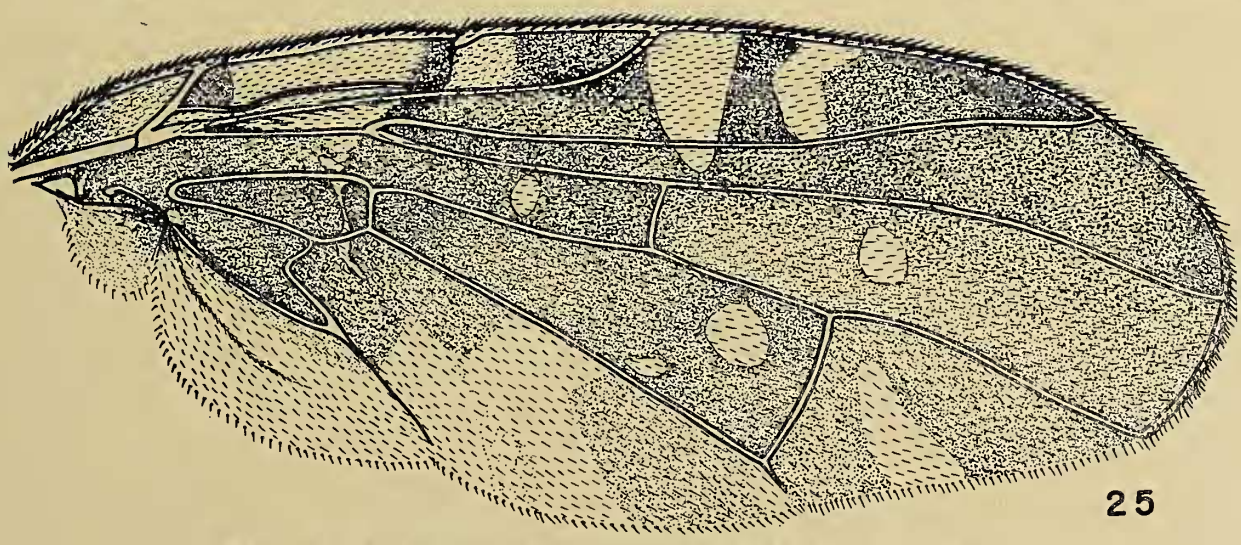


FIG. 25. *Acanthoneura australina* Hendel: wing of female.

of the cell. The brown coloring is rather faint in cell M_4 and indistinctly separates off three hyaline areas extending from the wing margin through the cell. The anal cell is hyaline except for a fumosity just below the anal vein. The squamae and fringe are largely black. *Abdomen:* First tergum yellow. Terga 2 to 4 are yellow to rufous in the middle, black on the sides. Fifth tergum all black, just faintly rufous in the middle. *Ovipositor:* Rufous and very conspicuous. The exposed portion is approximately two times longer than the remainder of the abdomen. The details of the piercer and inversion membrane have not been studied.

Length: Body, 5.0 mm.; wings, 6.0 mm.

TYPE LOCALITY: Cairns, North Queensland.

Type in the Deutsches Entomologisches Museum.

One specimen was in the Krauss collection from near Babinda, Queensland, Dec. 2, 1949.

Acanthoneura bicolor
(Macquart) new combination

Urophora bicolor Macquart 1855. Dipt. Exot., Suppl. 5: 144, pl. 7, fig. 7.

Rioxa bicolor Hendel 1928. Ent. Mitteil. 17(5): 352.

Rioxa bicolor Malloch 1939. Linn. Soc. N.S.Wales, Proc. 44(3–4): 436.

This species was not represented in the Krauss collection but its status was clarified during the course of this study and the information should be of value here.

The species described here as *Rioxa confusa* n. sp. was thought to be the same as *bicolor* (Macquart) and specimens were sent to Mr. J. E. Collin, Newmarket, England, for comparison with Macquart's type. Mr. Collin provided the following information in correspondence:

In reply to your enquiry I give you below some details of the specimens standing under the name of *Urophora bicolor* in Bigot's collection. The one which appears to be the actual type (bearing a label in Macquart's handwriting) is not in very good condition, having the appearance of being originally preserved in spirit, and though described as a female, is actually, I am practically certain, a male with some extraneous matter stuck on to the end of the abdomen. With this type there are two other males apparently added later, which are certainly the same species, and were labeled by Macquart "*Urophora bicolor* Macq. Male, Australia."

All these specimens are somewhat like those you sent me in wing markings, but entirely different in other characters, as noted below:—Arista practically bare. Face with an obvious median "keel" complete from lunule to mouthedge, quite narrow between antennae but rapidly widening out, leaving quite deep antennal foveae on each side. Frons wider than in your species, having two pairs of reclinate upper orbital bristles (front pair the longer) and only one pair of incurved lower orbitals, also numerous setulae scattered all over frons. Thorax tawny-yellow with four blackish stripes, middle pair wider than outer pair, and wider apart than they are from the outer ones. Scutellum tawny-yellow on a middle stripe but otherwise shining blackish except at extreme basal corner. Six equally strong scutellar bristles. A pair of prescutellar acrosticals and dorsocentrals, all equally strong, the latter placed slightly more anteriorly, and behind each of them (close to scutellar suture) a transverse row of about three much smaller bristles, a humeral, two notopleural, two supra-alar, and one postalar bristle, apparently no posthumeral or presutural. Pleurae yellow except metanotum which is blackish, bristles and all hairs black except latter on prothoracic episterna. Abdomen blackish at least towards tip, but sternites, and hypopygium beneath, of the same tawny-yellow colour as thorax. On wings the hyaline patches on each side of outer crossvein are slightly more widely separated than in Macquart's figures, and that on basal side of crossvein may be divided into two spots. Anal vein bent as in your species, but lower point of anal cell even longer. Insect larger and rather stouter than in your species, about 7 mm.

From these data it appears that Macquart's species belongs in the genus *Acanthoneura*.

It is distinguished from the other Australian species by the characters given in the above key.

TYPE LOCALITY: "Nouvelle-Hollande, Adelaide."

Type in J. E. Collin's collection (the Bigot collection), Newmarket, England.

Froggatt (1907) recorded the species from near Bathurst, New South Wales, "on trunks of wattle trees."

Bezzi (1913), Tryon (1927), Hendel (1928), and Malloch (1939*a*) have listed it as an Australian species. Malloch apparently erred when he stated: "the given type locality, Tasmania, is undoubtedly erroneous as usual."

CALLISTOMYIA Bezzi

Callistomyia Bezzi 1913. Ind. Mus. Mem. 3: 124.

This genus is distinguished from other Trypetinae which have four scutellar bristles by the short, stout, closely spaced spines on the ventral surface of the apical halves of the middle and hind femora. The known species are easily recognized as *Callistomyia* by the presence of a very large spot in the apex of the wing. This completely fills all of the apical three-fourths of cell R_5 and a large part of cell M_2. The wings are also characterized by a transverse band through the middle of the wing extending from the costal margin to the hind margin through the r–m crossvein. The chaetotaxy of this genus has been discussed by Malloch (1939*b*: 447).

GENOTYPE: *Callistomyia pavonina* Bezzi.

KEY TO KNOWN SPECIES OF *Callistomyia*

1. Abdomen with black bands on the anterior margins of terga 2 to, and including, 4 in the males and 5 in the females 2
   Abdomen not banded, except on the base of tergum 2 in one species 3
2. The large apical spot in the wing is joined with the transverse band across the middle of the wing in the lower part of cell 1st M_2 (Philippine Islands) ..... *icarus* (Osten Sacken)
   The apical spot is isolated, not joined to the transverse band (India–Formosa) ..... *pavonina* Bezzi
3. The apical spot is joined with the transverse band (Australia) .... *horni* Hendel
   Apical spot isolated (E. Indies) ..... *klugi* (Wiedemann)

Callistomyia horni Hendel

Fig. 26

Callistomyia horni Hendel 1928. Ent. Mitteil. 17: 361.

This is the only species of the genus which has been recorded from Australia. It is separated by the characters brought out in the key. According to the original description the abdomen is entirely rust-red and the mesonotum has five longitudinal black vittae. The specimen at hand appears to fit the original description except that the second abdominal tergum has a broad, black band on its anterior margin and the mesonotum has just three dark vittae.

The species at hand may be new, but since just a single specimen is present I prefer to treat it as *horni* with a query. The following description is based upon this specimen.

MALE. Chiefly reddish. *Head:* Brownish-red in ground color, occiput yellowish. Front slightly expanded below the middle and two times longer than wide. The front possesses two pairs of inferior fronto-orbital bristles and two pairs of superior fronto-orbitals. The middle portion of the face is flat and nearly straight from the lateral view. The antennae are yellow, and the third segment is not much over half as long as the face and slightly over two times longer than wide. The longest hairs on the aristae are about equal to one-third the width of the third segment. *Thorax:* The chaetotaxy fits the generic arrangement given by Malloch (1939 *b*: 447) except that no humeral bristles are

in evidence on the specimen at hand. The mesonotum is reddish with three narrow black vittae extending the full length—one down the middle and the other two in line with the dorsocentral bristles. The dorsal third to fourth of the pleura from the wing bases to the humeri are yellow, and the remainder is discolored with brown. The scutellum is all yellow except for a narrow brown band across the base. The metanotum is black, tinged with reddish in the middle. The halteres are reddish, tinged with brown. *Legs:* Chiefly yellow, tibiae tinged with brown. The middle and hind femora have two rows of short black bristles on the apical halves of the ventral surfaces. The hind tibiae have a row of short black bristles extending the entire length of the segment on the outer dorsal surface. The hind femora have a group of about 10 moderately strong black bristles arranged irregularly on the dorsal side near the apex. *Wings:* The large apical spot is joined with the transverse band across the middle of the wing in the lower portion of cell 1st M_2 (Fig. 26). The apical spot occupies all of the distal portions of cells R_5 and M_2 except for a narrow hyaline mark extending along the wing margin just above the apex of vein M_{3+4}. The last section of vein M_{3+4} from the m crossvein to the margin is comparatively elongate; it is equal to or longer than the r–m crossvein. *Abdomen:* Chiefly rufous except for a broad black band at the base of the first tergum and for the narrow black lateral margins of terga 1 to 5. The venter is entirely yellow to rufous.

Length: Body, 7.0 mm.; wings, 6.0 mm.

Female unknown.

TYPE LOCALITY: Palmerston, West Australia.

Type in the Deutsches Entomologisches Institut.

The specimen at hand is from near Hartley's Creek, N. Queensland, ex *Clausena brevistylus*, Feb., 1950.

Mr. May has informed me, in correspondence, that one specimen of *Callistomyia horni* is in Mr. Perkins' collection from Cairns.

CLUSIOSOMA Malloch

Clusiosoma Malloch 1926. Linn. Soc. N. S. Wales, Proc. 51: 547.

This genus is related to *Themarohystrix* Hendel and is distinguished by the more elongated antennae, by the absence of the pteropleural bristle and the presence of strong bristles on the middle and hind tibiae, by having the anterior two pairs of orbital bristles proclinate and incurved, as well as by other chaetotaxic characters reported by Malloch (1939*b*: 423).

GENOTYPE: *Clusiosoma semifusca* Malloch.

The two known Australian species are separated as follows:

Facial spots present; mesonotum with a pair of submedian black vittae extending the entire length from the outer scapular bristles to the hind margin and continuing over the

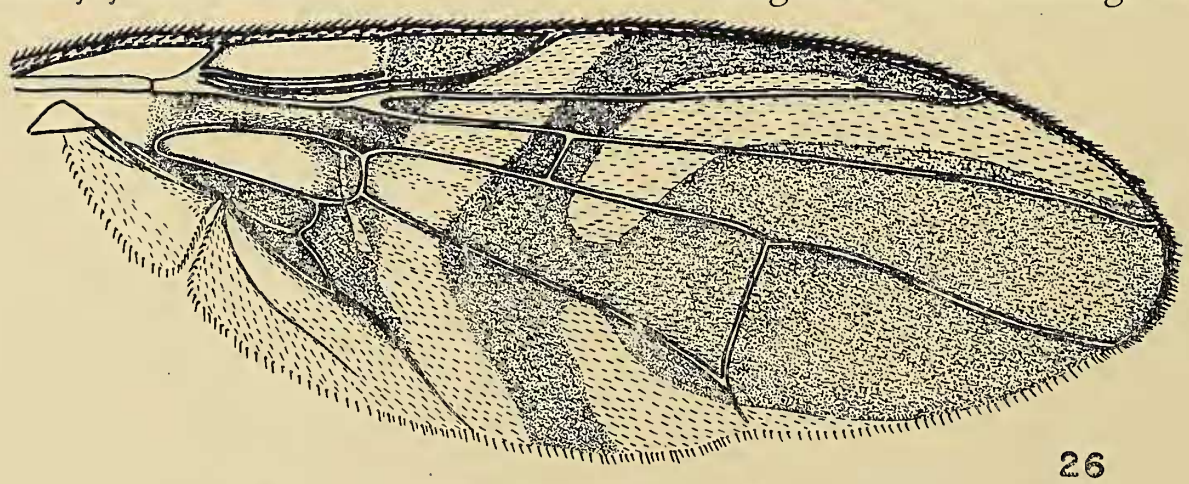


FIG. 26. *Callistomyia horni* Hendel: wing of male.

scutellum; median portion of scutellum yellow; front metatarsus of male with a projection at the apex which is covered with minute black spines at its tip (Fig. 27*a*) . . *puncticeps* Malloch

Face all yellow; the black vittae of the mesonotum are postsutural; the disc of the scutellum is dark brown; front tibia of male with a spongy swelling on posterior side but the tarsi are normal . . . . . *semifusca* Malloch

Clusiosoma (Clusiosomina) puncticeps Malloch

Fig. 27*a–c*

Clusiosoma (*Clusiosomina*) *puncticeps* Malloch 1939. Linn. Soc. N. S. Wales, Proc. 64: 426–427.

This very distinctive species has been adequately described by Malloch. It is readily separated from all known *Clusiosoma* by the peculiar process at the apex of each front metatarsus of the male (Fig. 27*a*) and by the characters given in the above key. The female ovipositor has not been described in the literature. A discussion of this may be of value here. The ovipositor is very short (Fig. 27*b*) and peculiarly modified; the extended length is about 2.5 mm. The piercer is about 0.66 mm. long by 0.19 mm. wide. It is very blunt at the apex and possesses a pair of large conspicuous spines which arise just before the tip (Fig. 27*c*); these spines are about 0.09 mm. in length. A series of short bristles occur on each side just behind

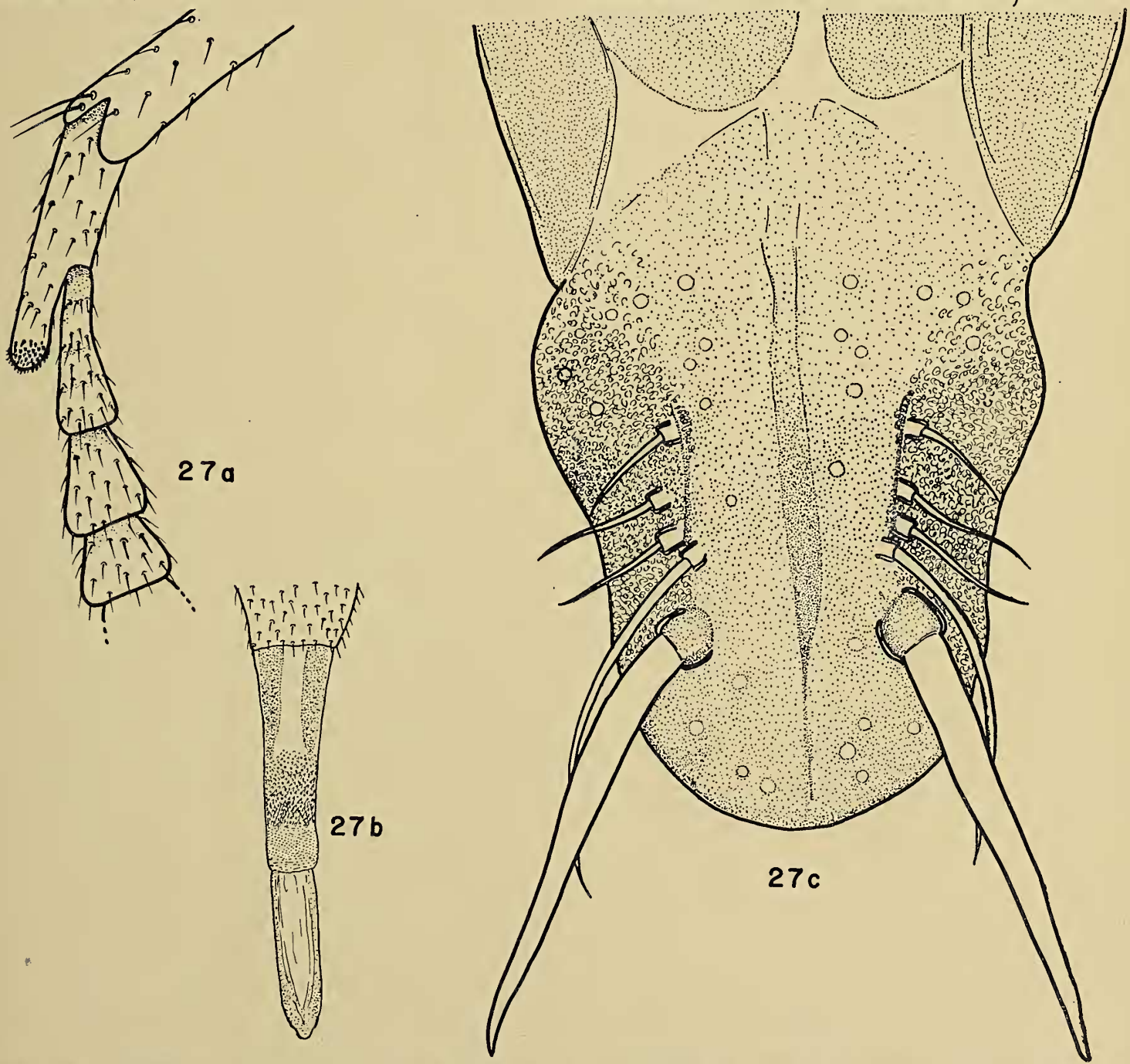


FIG. 27. *Clusiosoma* (*Clusiosomina*) *puncticeps* Malloch: a, front tarsus of male; b, ovipositor, full length; c, apex of ovipositor.

the spines. The tip of the oviduct is about 0.15 mm. from the apex of the piercer. The dorsal edges of the piercer fold onto the venter for a short distance about opposite the end of the oviduct. The inversion membrane is about 1.0 mm. long by 0.3 mm. wide measured at its broadest point. The scales are short and blunt and have a row of microscopic (visible under oil immersion) teeth at their apices. The scales extend to within 0.47 mm. of the base of the eighth segment. The basal half of this segment has a reticulated pattern on the sides where the rod-like sclerotization occurs. The basal portion of the ovipositor is about 0.9 mm. long by 0.9 mm. across its base.

Length: Body and wings, 4.0–4.3 mm.

TYPE LOCALITY: Gosford, New South Wales, in wild fig.

Type in the British Museum.

Specimens were sent in by Mr. Krauss from Narara, New South Wales, Jan. 17, 1947, ex *Ficus stephanocarpa*(?) (C. P. Hely).

EUPHRANTA Loew

Euphranta Loew 1862. Mon. Europ. Bohrfl. 28.

This genus is distinguished from other Trypetinae which have plumose aristae and four scutellar bristles by having the pleurotergite (lateral divisions of the metanotum) pilose, by having a strong sternopleural bristle, by having the pair of superior fronto-orbital bristles located well above the middle of the front and with two pairs of strong incurved inferior fronto-orbitals.

GENOTYPE: *Euphranta connexa* (Fabricius).

Euphranta minor Hendel is the only species of this genus which has been previously reported from Australia. A second, apparently undescribed species, is in the Krauss collection. It is distinguished from *minor* by the following characters:

Larger species, length of body 6.5–8.0 mm.; mesonotum yellow to rufous with conspicuous black markings; abdomen predominantly shining black and covered with black hair; the brown crossband over the r–m crossvein extending to the wing margin and fusing with the brown band which extends over m crossvein (i.e., the hyaline band through the middle of the wing ends at vein M_{3+4}); the apical hyaline spot small, not extending into cell 2d M_2 and scarcely into cell R_3 (Fig. 28*b*); all of the hind tibiae and the bases of the middle pair blackish. . . . . *linocierae* n. sp.

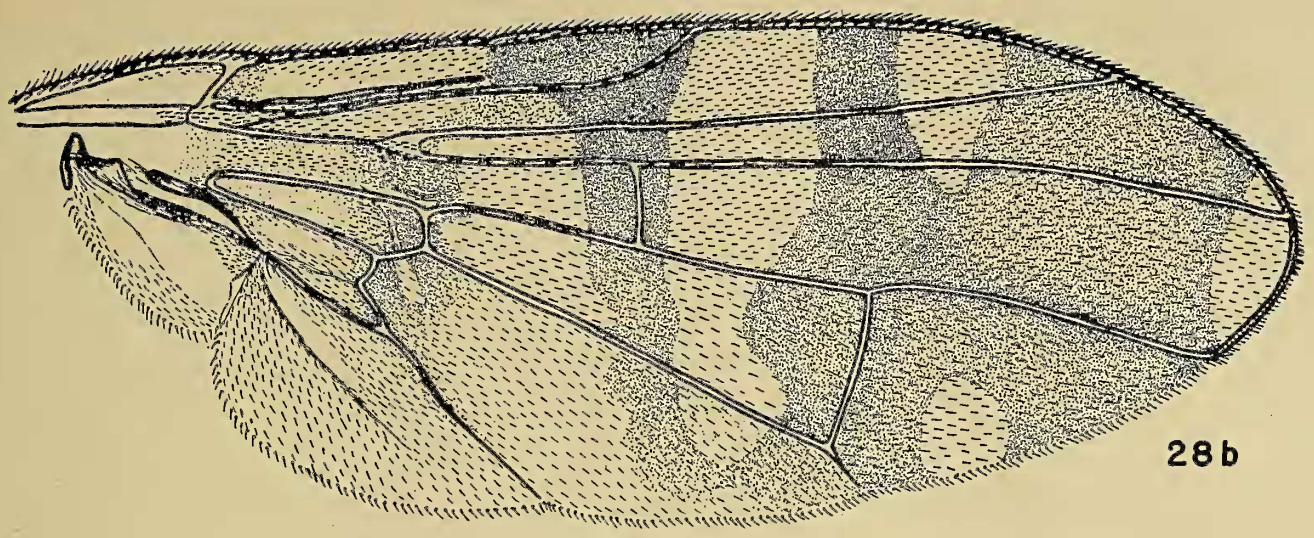
Smaller species, 4.0 mm. in length; thorax reddish-brown with no black markings on the mesonotum; abdomen rusty colored and yellow-haired; the brown band over r–m not extending to the wing margin and not connecting with the band over m (the hyaline band across the middle extends to the wing margin); the apical hyaline spot larger and extending well over the tips of veins R_{4+5} and M_{1+2}; the legs all yellow. . *minor* Hendel

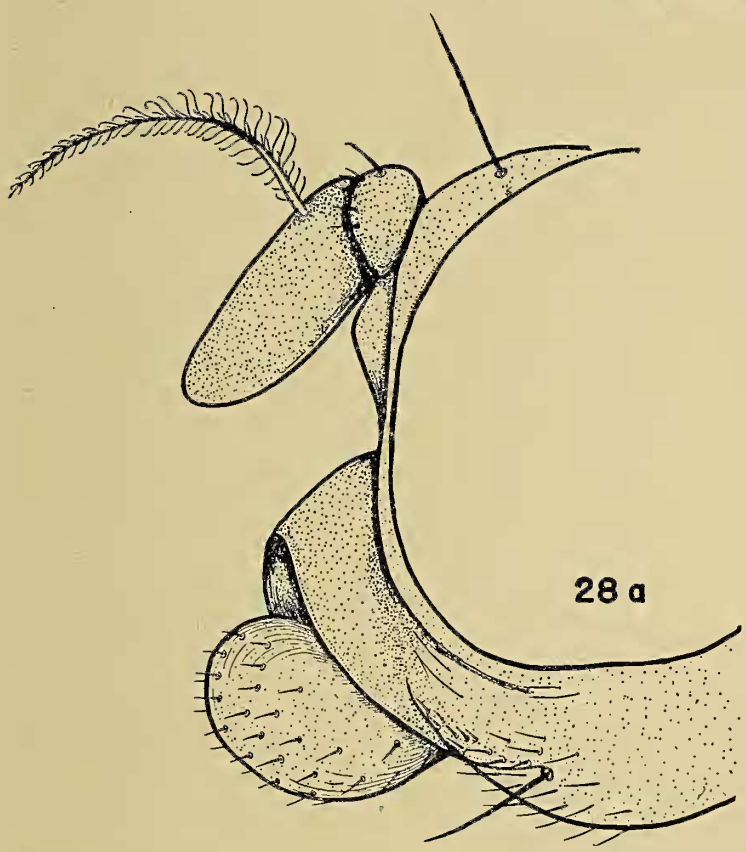
Euphranta linocierae n. sp.

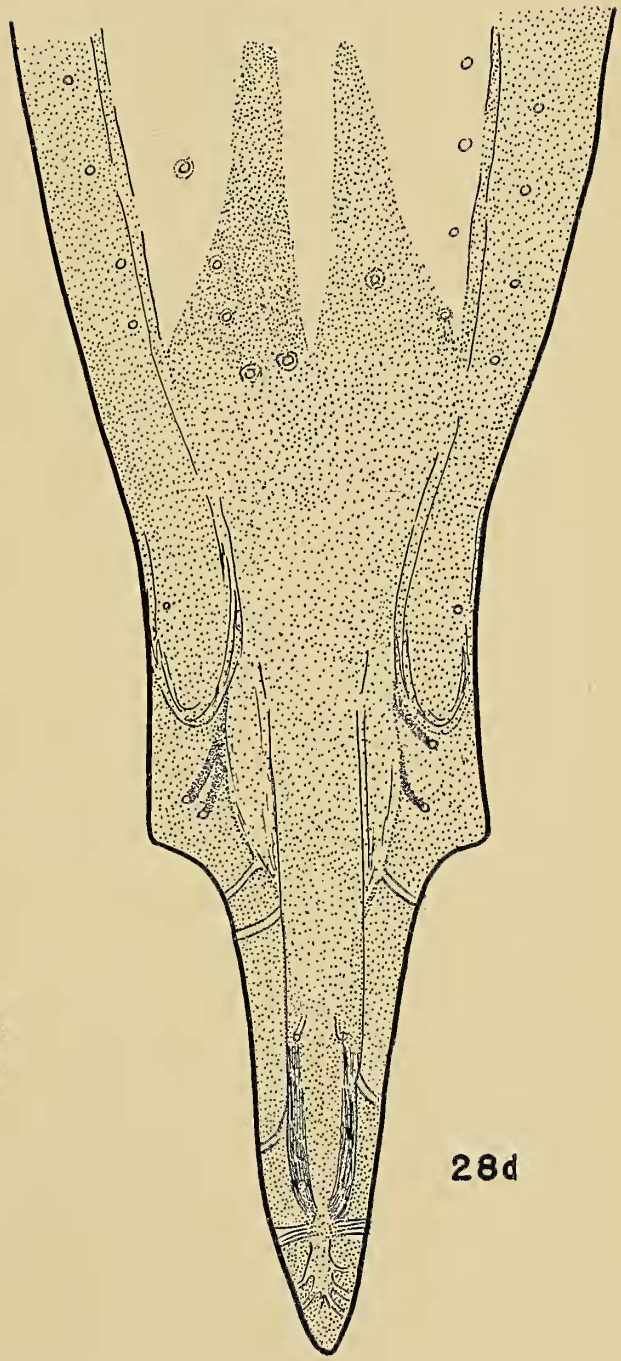
Fig. 28*a–d*

This species is related to *Euphranta minor* Hendel and differs in respects pointed out in the above comparison.

MALE. *Head:* Chiefly yellow to rufous, median portion of the front discolored with brown to black; lower portion of the face with a transverse brown to black band just above the oral margin. Front about one and one-third times longer than wide and slightly expanded on the lower portion. The antennae are yellow-red and the third segment is almost equal in length to the face; the longest hairs on the arista are about as long as the width of the third antennal segment. The face is rather deeply concave in the central portion; from a direct lateral view the bottom of the concavity is below the eye margin (Fig. 28*a*). The cheeks are about equal to slightly narrower than the width of the third antennal segment. The genal bristles are strong; they are almost as well developed as the anterior pair of inferior fronto-orbitals.







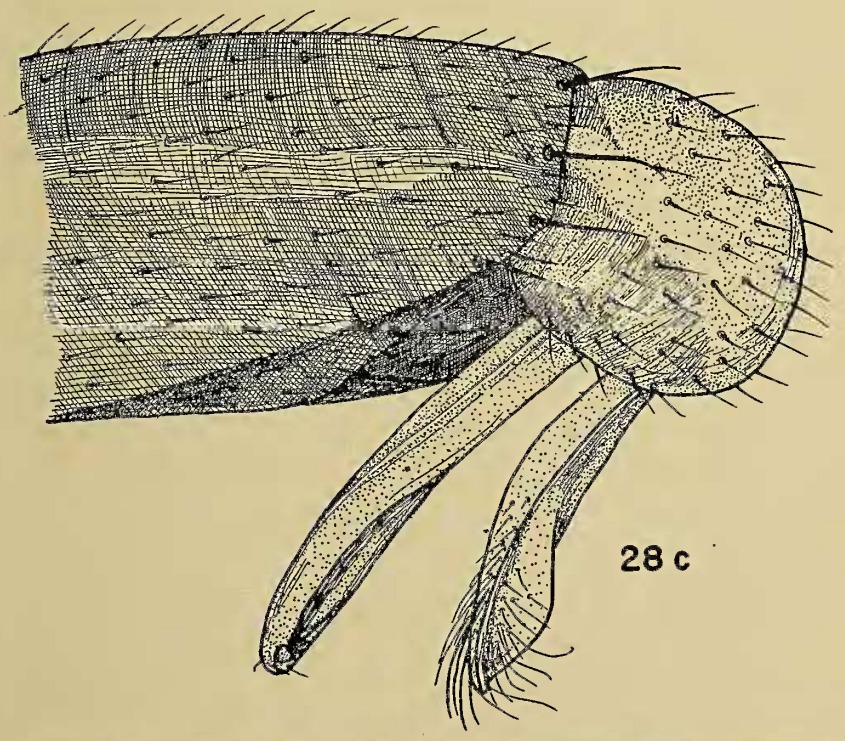


FIG. 28. *Euphranta linocierae* n. sp.: a, female head, lateral; b, wing of male; c, male genitalia, lateral; d, apex of ovipositor.

The compound eyes are oval in shape. The head bristles are all black. *Thorax:* Chiefly yellow to rufous, gray pollinose on the dorsum. A pair of broad subshining black postsutural vittae extends longitudinally through the area bounded on the sides by the inner posterior supra-alar bristles and by the dorsocentrals. The black vittae are broadly interrupted at the suture, and near their inner anterior apices they connect with a less distinct brown to blackish vitta which extends just inside the inner edges of the suture to the front margin of the mesonotum between the scapular bristles. The mesonotum also has a rather large presutural black spot just behind each humerus. The humeri and the scutellum are yellow. There is also a quadrate-shaped yellow spot, bounded by the prescutellar and the dorsocentral bristles, on the hind portion of the mesonotum. A transverse line of brown extends across the hind margin of the mesonotum almost connecting with the posterior apices of the lateral vittae. The dorsocentral bristles are situated distinctly behind the anterior supra-alars. The four scutellar bristles are stronger than any of the other thoracic bristles. The scutellum has a few very short black hairs around the margin and a clump of black hairs on each side just behind the basal pair of bristles. The metanotum, metapleura, lower portion of the sternopleura, and median portion of the hypopleura are brown to blackish in color. The halteres are yellow. *Legs:* Largely yellow, hind tibiae and bases of middle pair blackened. *Wings:* As described above and as shown in Figure 28*b*. The basal portion is chiefly hyaline, and a faint brownish infuscation extends across the base just in front; another brown spot covers the forking of the radial sector and the base of vein M_{3+4}. The stigma is all brown. The front margin of the wing has two hyaline indentations, one in the anterior one-third of the fourth costal section (cell R_2) extending transversely to vein M_{3+4}; the other mark is smaller and extends from the margin near the outer two-thirds of the fourth section into the top edge of cell R_5. One hyaline indentation occurs on the hind margin and extends about two-thirds through cell 2d M_2. Vein R_{4+5} is rather sparsely bristled to a point about opposite the halfway point between the r–m and m crossveins. *Abdomen:* The entire fifth tergum and the sides of the other terga are shining bluish-black. The median portion of terga 1 to 4 is rufous in ground color and densely grayish pollinose. The vestiture is all black; the apical margin of the fifth tergum has a ring of about 12 rather strong bristles. *Genitalia:* Yellow to reddish. The ninth segment is plainly visible from a dorsal view and is globose in shape. The anal area (tenth segment or proctiger) and the surstyli (the extended lower margins of the ninth tergum) are very elongate and slender (Fig. 28*c*). The anal region is thickly yellow pilose.

Length: Body, 6.5–8.0 mm.; wings, 5.5–6.5 mm.

FEMALE. Very similar to the male. In the two specimens at hand the brown band across the lower portion of the face is interrupted in the middle. The sides of the fifth and sixth terga are yellow, the median portion is polished black. The coloration of the body is otherwise as in the males. *Ovipositor:* Short and rather broad, the extended length slightly less than 3.0 mm. The piercer measures about 0.75 mm. long by 0.24 mm. wide and is very characteristic in shape. It is very sharply constricted toward the apex, the constriction beginning about 0.19 mm. from the tip (Fig. 28*d*). The preapical setae are tiny and inconspicuous, and they are situated about 0.04 mm. from the apex of the piercer. The oviduct ends about 0.13 mm. from the apex. The inversion membrane, which is torn on the specimen which has been dissected, is apparently about 1.2 mm. long by 0.3 mm. wide. The scales are rather sharp pointed and extend to within 0.6 mm. of the base of the segment.

Holotype male, allotype female, and two

paratypes (one male and one female): Cairns, Queensland, ex *Linociera ramiflora*, Sept., 1949.

Type in the United States National Museum. Allotype and one paratype in the Bishop Museum, Honolulu, T. H., and one paratype in the University of Hawaii collection.

HENDELINA new name

Pseudopheniscus Hendel 1913. Suppl. Ent. 2:82.
Pseudospheniscus Hendel 1914. Wien Ent. Zeitung 33:83.

Pseudopheniscus Hendel was an erroneous spelling which was corrected to *Pseudospheniscus* by Hendel in 1914. The genus was based upon *sexmaculata*, which Hendel transferred from *Spheniscus* Becker (*Spheniscomyia* Bezzi = change of name for *Sphaeniscus* Becker 1908—emended to *Spheniscus* by Bezzi 1913—nec *Spheniscus* Brisson 1760). Hendel (1915: 451) stated that through an oversight he had indicated a false type for *Pseudospheniscus*—that the genotype should be *angulatus* Hendel, not *sexmaculatus* Macq. The name *Pseudopheniscus* would therefore be a synonym of *Spheniscus* Becker because of the error made in choosing the original genotype.

The name *Pseudospheniscus* Hendel (as has been used in literature since Hendel corrected the spelling) is preoccupied in the birds by *Pseudospheniscus* (Ameghino, 1906).

If the original spelling *Pseudopheniscus* is accepted, the name would have to fall as a synonym since the only included species, *sexmaculata*, belongs in *Spheniscomyia*. If the corrected spelling *Pseudospheniscus* is accepted, the name has to be discarded as a homonym.

This is apparently the first published record of this genus from Australia. Mr. Alan May (in correspondence) has informed me that "two species of *Pseudospheniscus bifidus* Bezzi and *fossatus?* occur in Australia both being represented in Perkins' collection and both taken in North Queensland." I doubt that *fossatus* (Fabricius) actually occurs in Australia and believe that the specimens in Perkins' collection may belong to the new species discussed below.

The genus is distinguished from other Trypetinae by having four marginal scutellar bristles, by possessing dorsocentral bristles, by having two to three pairs of inferior fronto-orbital bristles and two pairs of superior fronto-orbitals, by the comparatively weak ocellar bristles which are much shorter than the superior fronto-orbitals, and by having the front narrower than the eyes and usually two or more times longer than wide.

The genus is closely related to *Neanomoea* Hendel and is distinguished by the narrow front. The Australian species at hand has the front about two times longer than wide and much narrower than the eyes. In *Neanomoea* the front is broader than the eyes and is only about one and one-half times longer than wide. It differs from *Anomoea* Walker, as characterized by Malloch (1939*b*:448–449), by not having the antepenultimate section of the fourth vein (M_{1+2}) bent downward just before the r–m crossvein. It differs from *Phagocarpus* Rondani as characterized by Bezzi (1913: 130–131), Shiraki (1933: 182–184), and Hering (1938: 20) by not having the discal cell (1st M_2) sharply pointed on lower apex or the m crossvein oblique in position.

GENOTYPE: *Hendelina angulata* (Hendel).

KEY TO KNOWN PACIFIC SPECIES OF *Hendelina*

1. Costal margin of wing not all black, with two or more hyaline indentations or marks..... 2
   Costal margin entirely black from the base of the wing to the middle of cell R_5 (Fiji).....*bifida* (Bezzi)
2. Costal cell containing one or two hyaline marks; no black streak extending obliquely through cell R_5..... 3
   Basal half of wing, excluding anal and auxiliary cells, all black; cell R_5 with an oblique streak extending from

vein R_{4+5} to the apex of M_{1+2} (Fig. 29*a*) 5

3. Costal cell with two hyaline spots; cell R with a small round spot just behind the r–m crossvein; no wedge-shaped hyaline mark on costal margin just beyond stigma; mesopleura yellow (Fiji) . . . . . *mesopleuralis* (Malloch)

Costal cell with one hyaline mark; no spot in cell R; a wedge-shaped spot just beyond stigma; mesopleura black 4

4. Mesonotum densely brownish-gray pollinose, with three dark vittae; vein R_{4+5} bristled only to the r–m crossvein (New Guinea) . . . . . *taylori* (Malloch)

Mesonotum entirely shining black; vein R_{4+5} setulose nearly its entire length (New Guinea) . . . *erebia* (Hering)

5. Wing markings as in Figure 29*a*. The black margin at the wing apex continuous with the vertical black band through the wing; the hyaline mark in the apical portion of the wing not inverted Y-shaped and comparatively broad, extending from the middle of cell R_5 to near lower apex of cell M_2; cell M_2 almost all hyaline at its apex; the hyaline transverse markings toward middle of wing extending into the apical portion of cell 1st M_2 on the top as well as the lower margin; the black coloration extending to the apex of cell M_4 in the middle and fills all of this cell except the lower edge (Australia) . . . . . *australina* n. sp.

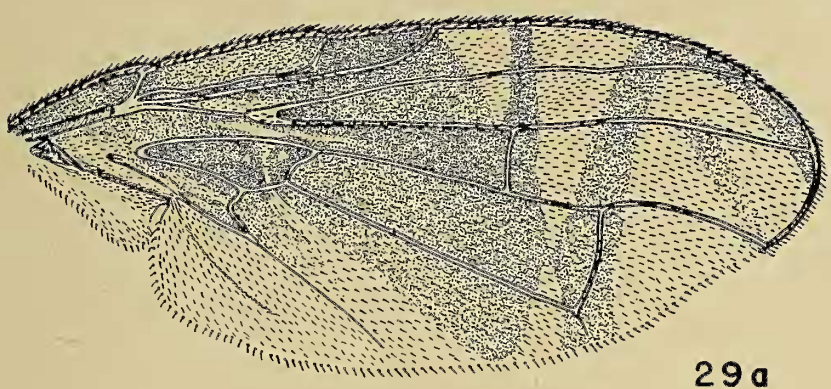
Wing markings as in Figure 30. The black margin at the wing apex not continuous with the black vertical band; the hyaline mark in apical portion in the form of an inverted Y and comparatively narrow, extending from lower portion of cell R_5 to about middle of cell M_2. The hyaline "arms" of the Y-shaped mark about equal in width to the oblique, black streak which sets off the Y, cell M_2 almost all black at its apex; the hyaline transverse markings not extending into cell 1st M_2 so this cell is entirely black; the black markings not extending to the margin in cell M_4, except at the upper corner, and the lower two-fifths of this cell hyaline (Solomon Islands) . . . . . *apicifasciata* (Malloch)

Hendelina australina n. sp.

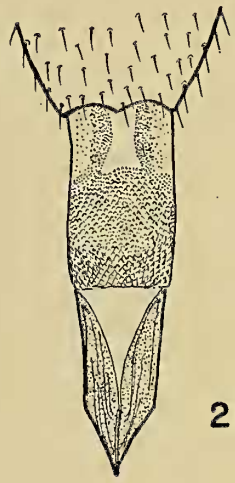
Fig. 29*a–c*

This species appears to be more closely related to *H. apicifasciata* (Malloch) (Fig. 30) than to any other known species. It is easily separated by the differences in the dark pattern in the wings as pointed out in the above key.

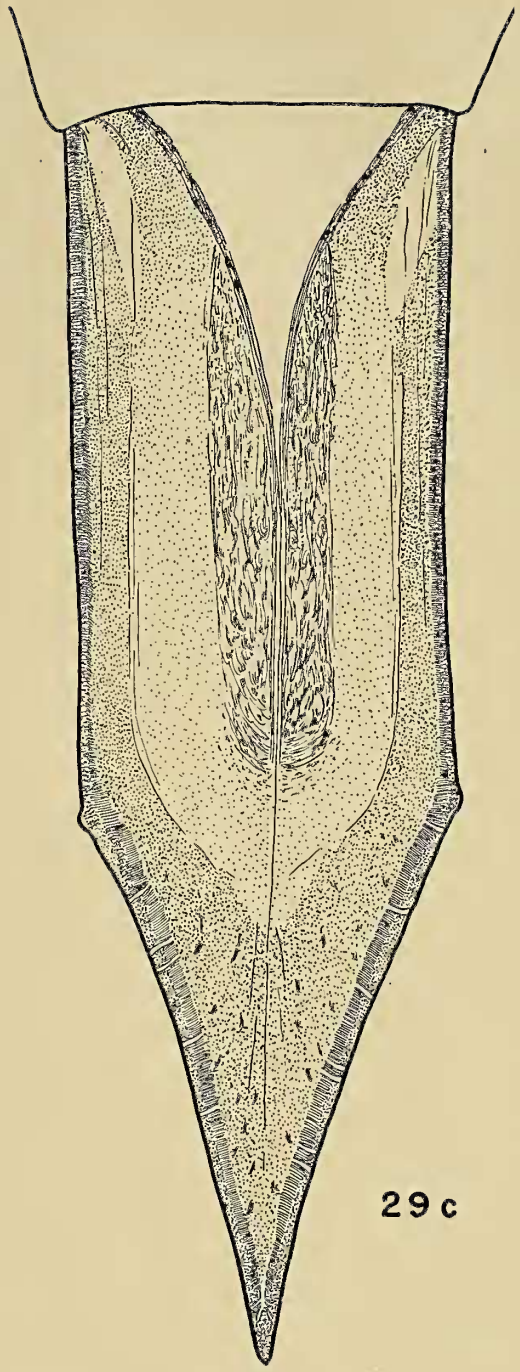
MALE. Chiefly black species. *Head:* Yellowish to rufous, concave portion of the occiput black. Front about two times longer than wide, and with three pairs of inferior fronto-orbital bristles and two pairs of superior fronto-orbitals. Ocellar bristles moderately developed and slender. They are about half as long as the superior fronto-orbitals. Face silvery pubescent, median portion flat and straight, sides rather deeply grooved. Antennae yellowish, third segment about two times longer than wide. *Thorax:* All black except for the yellowish humeri. Pleura subshining, mesonotum and scutellum grayish pollinose. Dorsocentral bristles placed distinctly posterior to the anterior supra-alar bristles. The scutellum has four strong bristles and a few small marginal hairs. Halteres black. *Legs:* Front pair all yellow except for slight brownish discoloration on the outside of each femur. Middle and hind femora and the bases of the tibiae black, except for extreme tips of middle femora which are yellow. Middle and hind tarsi and apical three-fourths of the tibiae yellow. The spurs of the middle tibiae are well developed and are about half as long as the basitarsi. The front femora have a row of moderately long bristles evenly spaced along the exterior ventral portion. *Wings:* (Fig. 29*a*.) Basal half, excepting anal and auxiliary lobes and posterior one-third



29a



29b



29c

FIG. 29. *Hendelina australina* n. sp.: a, wing; b, ovipositor, full length; c, apex of ovipositor.

of cell M_4, all black. Costal margin with a broad, wedge-shaped, hyaline mark extending to vein R_{4+5} at the r–m crossvein. A second hyaline indentation extends from the costal margin in the middle of cell R_2 through cells R_2, R_3, R_5, and to nearly the middle of the apical part of cell 1st M_2. This mark is typically interrupted by brown to black coloration in the middle of the apex of 1st M_2 and continues again through the remainder of this cell to the wing margin through the apex of cell M_4. In some specimens this hyaline mark is continuous from the costal to the hind margin of the wing

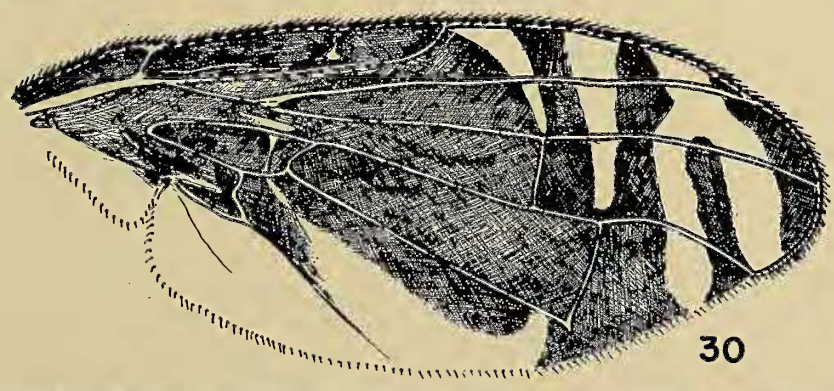


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FIG. 30. *Hendelina apicifasciata* (Malloch): wing. (Copied from original.)

and is not interrupted in the middle of 1st M_2. The apical portion of the wing is hyaline except for a narrow brown to black band extending transversely through the apical third of the wing and continuing around the costal margin to nearly the middle of cell R_5 and for the narrow black streak which extends obliquely from the apex of vein M_{1+2} to vein R_{4+5}. Vein R_{4+5} is setulose only to the r–m crossvein. Vein R_3 is very slightly wavy and the ultimate section of vein R_{4+5} is curved upward in the middle portion. The third costal section (stigma or subcostal cell) is about two-thirds as long as the second section. The r–m crossvein is situated about its own length from the end of the discal cell (1st M_2), and the m crossvein is vertical in position. The narrowed portion of the cubital cell is equal to slightly more than half the length of the r–m crossvein. Vein Cu_1+1st A extends to the wing margin. *Abdomen:* All black, polished on the fifth tergum and subopaque on terga 1 to 4. Rather thickly covered with short, black reclinate hairs and with six to eight strong bristles on the apical margin of the fifth tergum. The genitalia have not been studied carefully. They are tinged with yellowish and the lobes of the ninth segment are slender, rather elongate, and bear long hairs at their apices.

Length: Body, 4.2 mm.; wings, 3.8 mm.

FEMALE. Very similar to the male. Terga 4 and 5 and the basal segment of the ovipositor (segment 7) are polished black. The ovipositor is inconspicuous from a dorsal view—just the basal portion is visible. The exposed portion of the ovipositor is about equal in length to the fifth abdominal segment. The extended ovipositor is short and thick (Fig. 29*b*), and the tip of the piercer is characteristically tapered. The full length of the ovipositor is about 1.9 mm. The piercer is approximately 0.6 mm. long by 0.18 mm. at its broadest point. The basal three-fifths of the piercer is straight sided. At the point where the piercer begins to taper, a tubercle is located on each side; beyond (at the apical two-fifths) the piercer tapers abruptly into a sharp point (Fig. 29*c*). The opening of the oviduct is about 0.18 mm. from the apex of the piercer, and there are no preapical setae present. The inversion membrane is about 0.6 mm. long by 0.26 mm. wide; the scales of the rasper extend to about 0.18 mm. from the base of the segment. The remainder of this segment is densely covered with scales which vary in shape from thorn-like on the apical portion, triangular in the middle, and obtuse at the basal part of the rasper. The basal segment of the ovipositor is about 0.75 mm. long by 0.9 mm. across its hind margin. The spiracles are located about 0.3 mm. from the base of the segment.

Length: Body, 4.2–4.5 mm.; wings, 3.8–4.0 mm.

Holotype male, allotype female, and 14 paratypes (10 females and 4 males): Hartley's Creek, N. Queensland, ex *Primna nauseosa*, Feb., 1950.

Type, allotype, and two paratypes are in the United States National Museum. Three paratypes are in the Bishop Museum, Honolulu, T. H.; three in the Board of Agriculture and Forestry collection, Honolulu, T. H.; two in the Hawaiian Sugar Planters' Association collection, Honolulu, T. H.; three at the University of Hawaii; and one in Dr. M. Hering's collection at the University of Berlin.

RIOXA Walker

Rioxa Walker 1857. Linn. Soc. Lond., Proc. 1: 35.

The members of this genus are distinguished from other Trypetinae which have six scutellar bristles and a plumose arista by having veins R_{1+2} and R_{4+5} setulose but with the setulae on R_{1+2} not extending onto the node of the radial vein, by having the wings chiefly brown to black with round hyaline spots in the middle of the wing and hyaline

incisions around the margin, by having the dorsocentral bristles placed distinctly behind the anterior supra-alars, by having the mesonotum scarcely longer than wide, by the lack of pile on the scutellum, and by having two pairs each of superior and inferior frontoorbital bristles. Malloch (1939*a*) removes *Termitorioxa* from *Rioxa* on the basis of the differences in the frontal bristles and the narrower mesonotum and by the presence of small hairs on the scutellum. According to Hendel (1928) (also Malloch, 1939*a*) three Australian species belong in the genus *Rioxa*. He assigns them to the subgenus *Dirioxa* Hendel. Malloch says that *Rioxa araucariae* Tryon and *R. jarvisi* Tryon do not belong in *Rioxa*. It is now quite apparent that *bicolor*, also, does not fit into this group, but belongs to the genus *Acanthoneura*.

GENOTYPE: *Rioxa lanceolata* Walker.

KEY TO AUSTRALIAN *Rioxa*

1. The hyaline spots in cell R_5 are nearly as wide as the cell (Fig. 32*a*). . . . . *pornia* (Walker)
   The hyaline spots are comparatively small, about half as wide as cell R_5. . 2
2. The hyaline spot in cell R_5, just above the m crossvein, is connected with the large wedge-shaped hyaline mark in cell 2d M_2; the hyaline mark in the apex of cell 1st M_2 not extending across the cell. . . . . *testacea* Hendel
   The spot in cell R_5, above the m crossvein, is isolated from the wedge-shaped mark in 2d M_2; the hyaline mark at the apex of 1st M_2 extends across the cell through cell M_4 to wing margin . . . . . *confusa* n. sp.

Rioxa (Dirioxa) confusa n. sp.

Fig. 31*a–d*

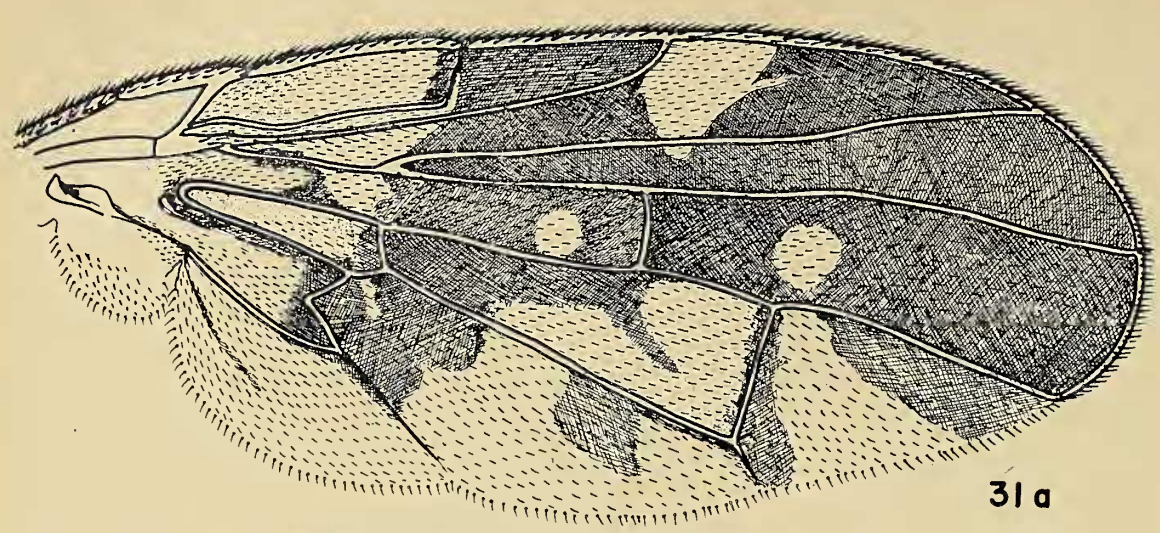
The *Rioxa* of Australia have not been thoroughly studied and this species has never been properly placed. It had previously been considered to be *Rioxa pornia* (Walker) but was found to be quite a different species when the true identity of *pornia* was ascertained. The species was then considered to be *bicolor* Macquart, which had been assigned to *Rioxa* by Hendel (1928) and Malloch (1939*a*). The wing coloration of *R. confusa* fits Macquart's figure (1855, pl. 7, fig. 7) rather closely in most respects, allowing for the inaccuracy in detail characteristic of many of Macquart's figures. *R. confusa* wings differ by having smaller, rounder spots in cell R_5, by having the hyaline mark in the apex of cell 1st M_2 enlarged in the upper portion and not just a narrow streak across the apex, by having the brown coloration extending from cell 1st M_2 into cell M_4 not reaching to the wing margin, and by having the hyaline marking in cell M_4 extending to the middle part of cell 1st M_2 (Fig. 31*a*).

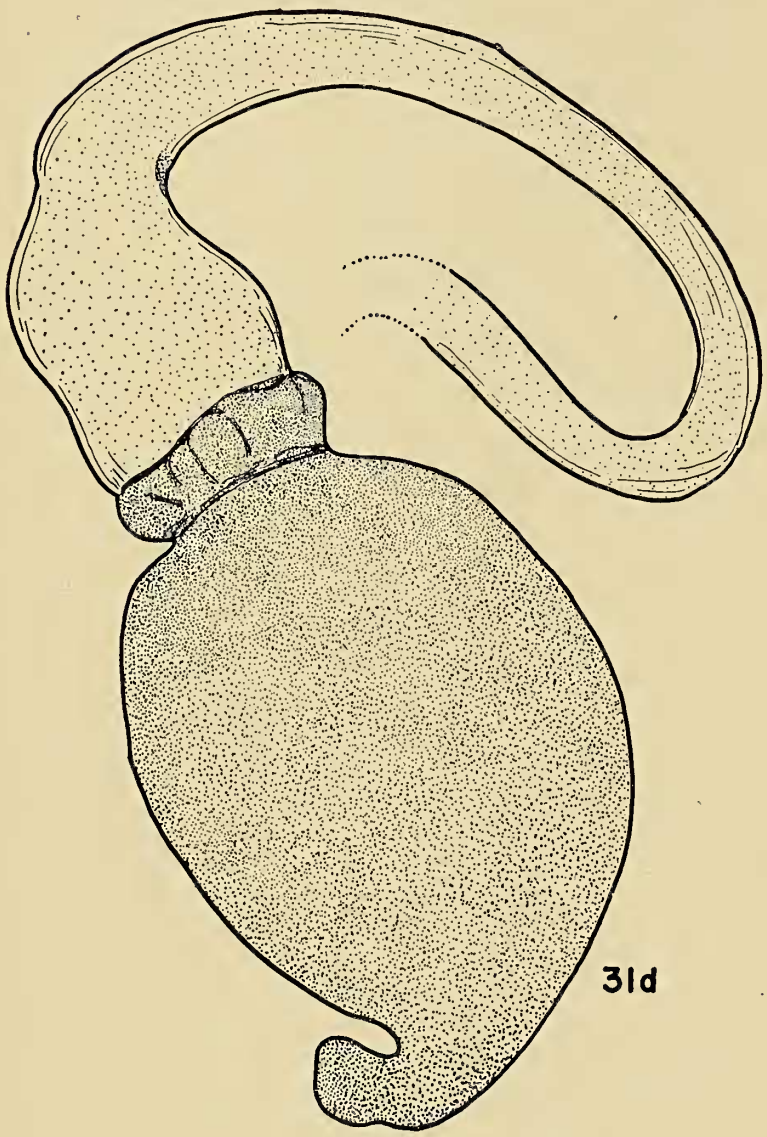
R. confusa is apparently more closely related to *R. testacea* Hendel than to any other known species. It is distinguished by the characters given in the above key.

MALE. A predominantly yellow species with dark brown to black maculations in the wings. *Head:* The face is one and one-half times longer than wide; the lower portion is discolored with red. The face is straight on the upper two-thirds and tumescent below. The gena are about as wide as the third antennal segment. *Thorax:* Entirely clear yellow, subshining, very lightly grayish pollinose. *Legs:* All yellow. *Wings:* As given in the above key and notes and as shown in Figure 31*a*. The first costal cell is hyaline and bare; the second cell is covered with microtrichia and is yellowish-fumose in the basal portion. The marginal fringe on the squamae is made up of gray to blackish hairs. *Abdomen:* The first three terga are yellowish; the fourth is yellow to rufous in the middle and brown to black on the sides. The fifth tergum varies from yellow to rufous in the middle and brown to black on the sides to chiefly brown to black with a tinge of rufous in the middle at the apex.

Length: Body, 5.0 mm.; wings, 5.5 mm.

FEMALE. Very similar to the male. *Ovipositor:* In pinned specimens just the basal segment is visible. It is dark brown to black





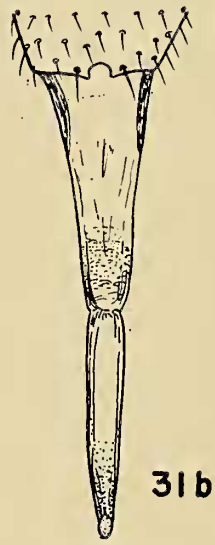
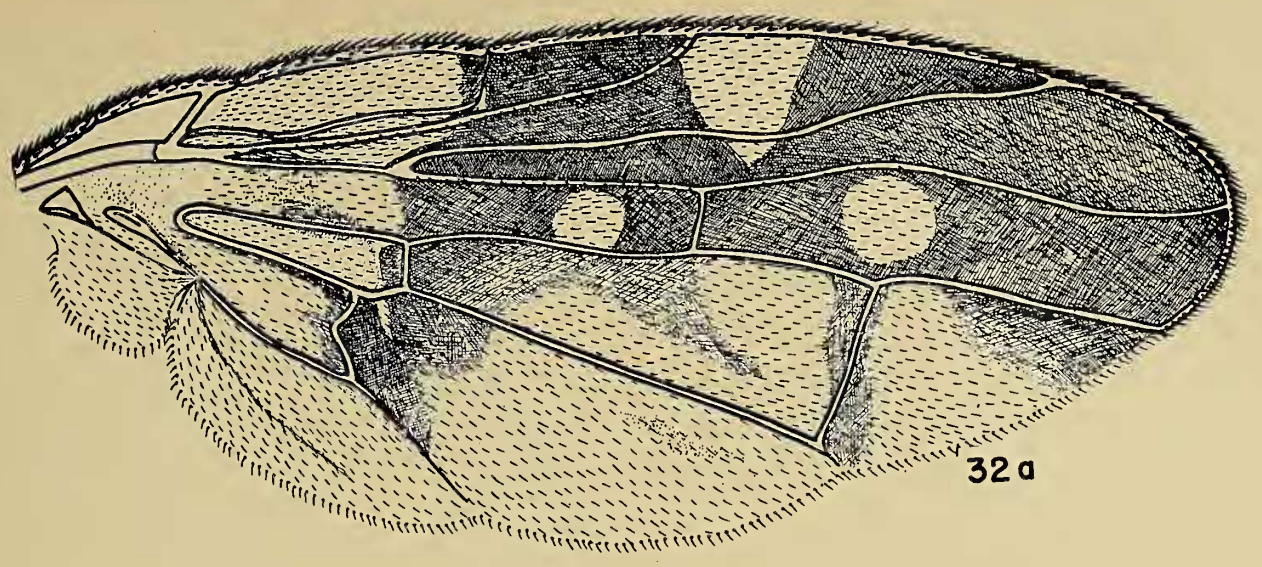
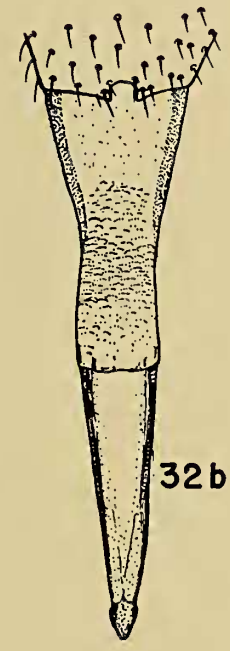


FIG. 31. *Rioxa* (*Dirioxa*) *confusa* n. sp.: a, wing; b, ovipositor, full length; c, apex of ovipositor; d, a spermatheca of female.

and is nearly as long as the combined lengths of segments 3 to 5. The extended ovipositor (Fig. 31*b*) is about 2.27 mm. long. The piercer measures about 0.7 mm. in length and is very blunt at the apex and somewhat swollen in the middle. At its widest point the breadth is about 0.15 mm. The piercer is slightly constricted a short distance behind the apex, at about the end of the oviduct (Fig. 31*c*). The piercer has four pairs of setae located almost at the apex; the distad pair are long and strong, extending well beyond the tip of the piercer. The basal pair are short and scarcely one-fourth as long as the distad pair. The apex of the oviduct is about 0.09 mm. from the tip of the piercer. A pair of sublateral





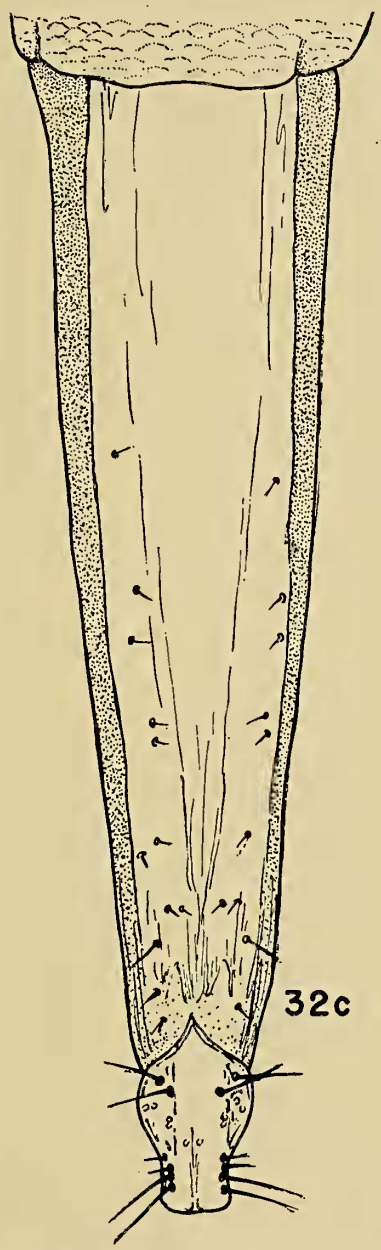


FIG. 32. *Rioxa pornia* (Walker): a, wing; b, ovipositor, full length; c, apex of ovipositor.

setae are situated on each side just beyond the oviduct opening, and a row of six to eight setae are situated near the sides of the ventral margin and extend basad to beyond the middle of the segment. The inversion membrane is about 0.77 mm. long by 0.32 mm. wide. The rasper is not made up of scales but is composed of numerous raised ridges which bear microscopic dentations on their hind margin. The rasper extends about half the length of the segment, or about 0.38 mm. from the base. The basal segment of the ovipositor is about 0.8 mm. long by 0.8 mm. at its widest point. The spiracles are located very

close (0.09 mm.) to the base of the segment. The spermathecae are distinctive in shape (Fig. 31*d*). They are apparently three in number but one specimen studied had four.

Type male, allotype female, and 115 paratypes from Atherton Tableland, Queensland, ex *Planchonella* sp.(?), Nov.–Dec., 1949; 30 paratypes from Julatten, Queensland, ex *Amorphospermum antilogum*, and 2 from Mowbray River, Queensland, ex *Capparis lucida*, Feb., 1950.

Type, allotype, and a series of paratypes are in the United States National Museum collection. The remainder are deposited in the following collections: Board of Agriculture and Forestry, Honolulu, T. H.; Bishop Museum, Honolulu, T. H.; Hawaiian Sugar Planters' Association, Honolulu, T. H.; Australian Museum, Sydney; University of Hawaii; Dr. H. K. Munro, Pretoria, South Africa; Dr. M. Hering, University of Berlin; and Mr. J. E. Collin, Newmarket, England.

Rioxa pornia (Walker)

Fig. 32*a–c*

Trypeta pornia Walker 1849. List Dipt. Brit. Mus. 4: 1039.
Trypeta musae Froggatt 1899. Agr. Gaz. N. S. Wales: 501.
Tephritis psidii (Froggatt) Tryon 1904-5. An. Rep. Entom.: 71.
Dacus musae (Froggatt) Gurney 1912. Agr. Gaz. N. S. Wales: 75.
Rioxa musae (Froggatt) Tryon 1927. Roy. Soc. Queensland, Proc. 38: 216.

This species is readily distinguished by the large spots in cell R_5, the paler brown maculations in the wings, and the different coloration of the abdomen. In general details it will fit the above description of *R. confusa* n. sp. The wing maculation is as given in the above key and shown in Figure 32*a*. The first two abdominal segments are yellow to cream. The third is yellow in the middle, this mark expanding posteriorly to cover most of the hind margin; a wedge of black extends on each side from the lateral margins about one-third the distance across the anterior margin. The fourth and fifth segments of the male are entirely subshining black. The female has a narrow yellow mark across the front margin of the fourth tergum. *Ovipositor:* Shining black; the visible portion is not quite as long as terga 4 plus 5. The extended ovipositor is almost identical with that of *confusa*. No satisfactory specific characters have been found in the ovipositors. That of *pornia* (Fig. 32*b–c*) appears to have more distinct dentations on the rasper, the longitudinal bars in the basal part of the inversion membrane appear more heavily sclerotized, and the piercer is more straight sided; these may be individual variations.

Length: Body, 5.0 mm.; wings, 5.5–6.0 mm.

TYPE LOCALITY: Port Stephens, New South Wales.

Type in British Museum.

Specimens were received from Mr. Krauss from Gosford, New South Wales, ex "feijoa fruit," Apr., 1950 (Krauss); and Narara, New South Wales, "trapped," Nov. 29, 1933 (C. P. Hely).

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